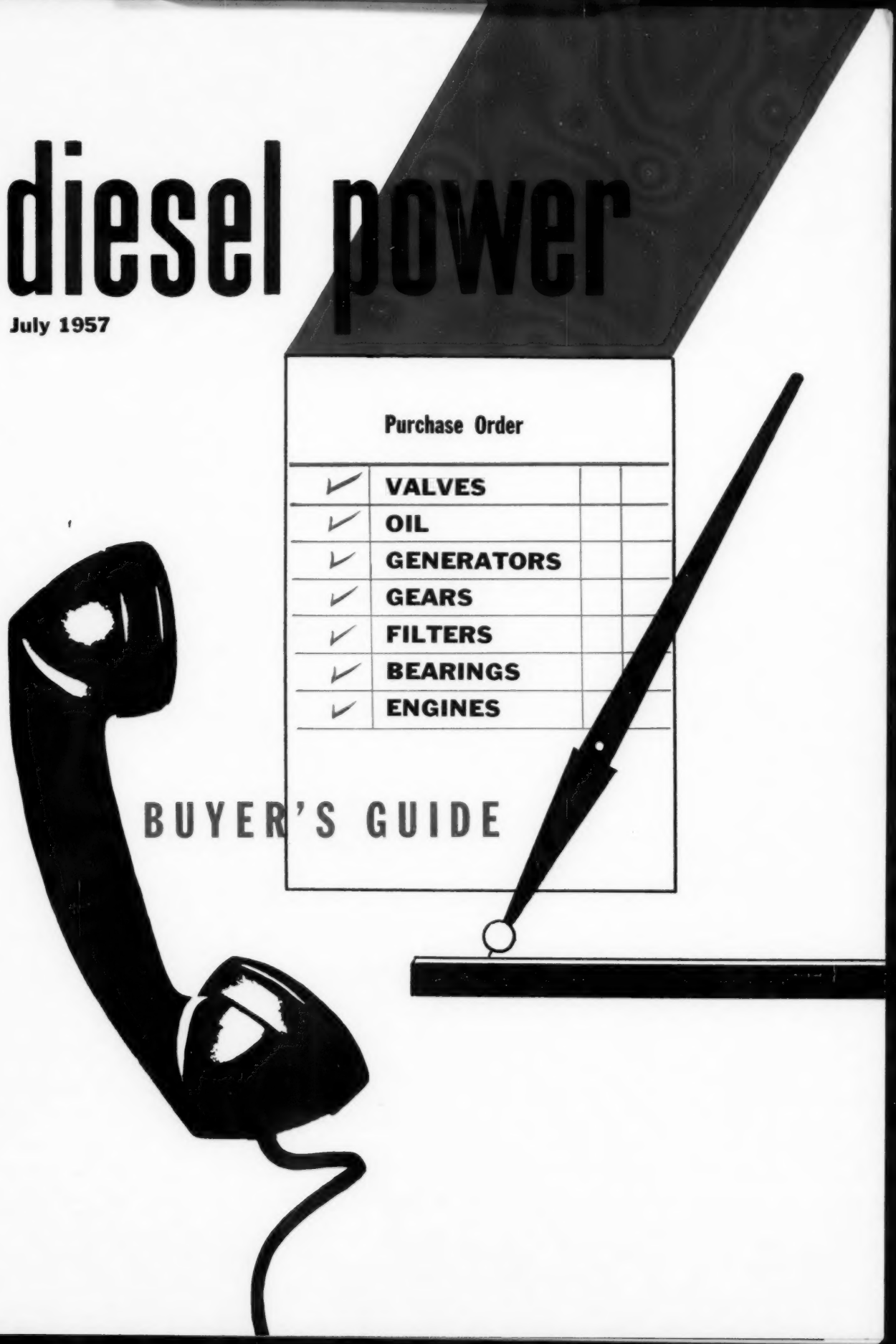
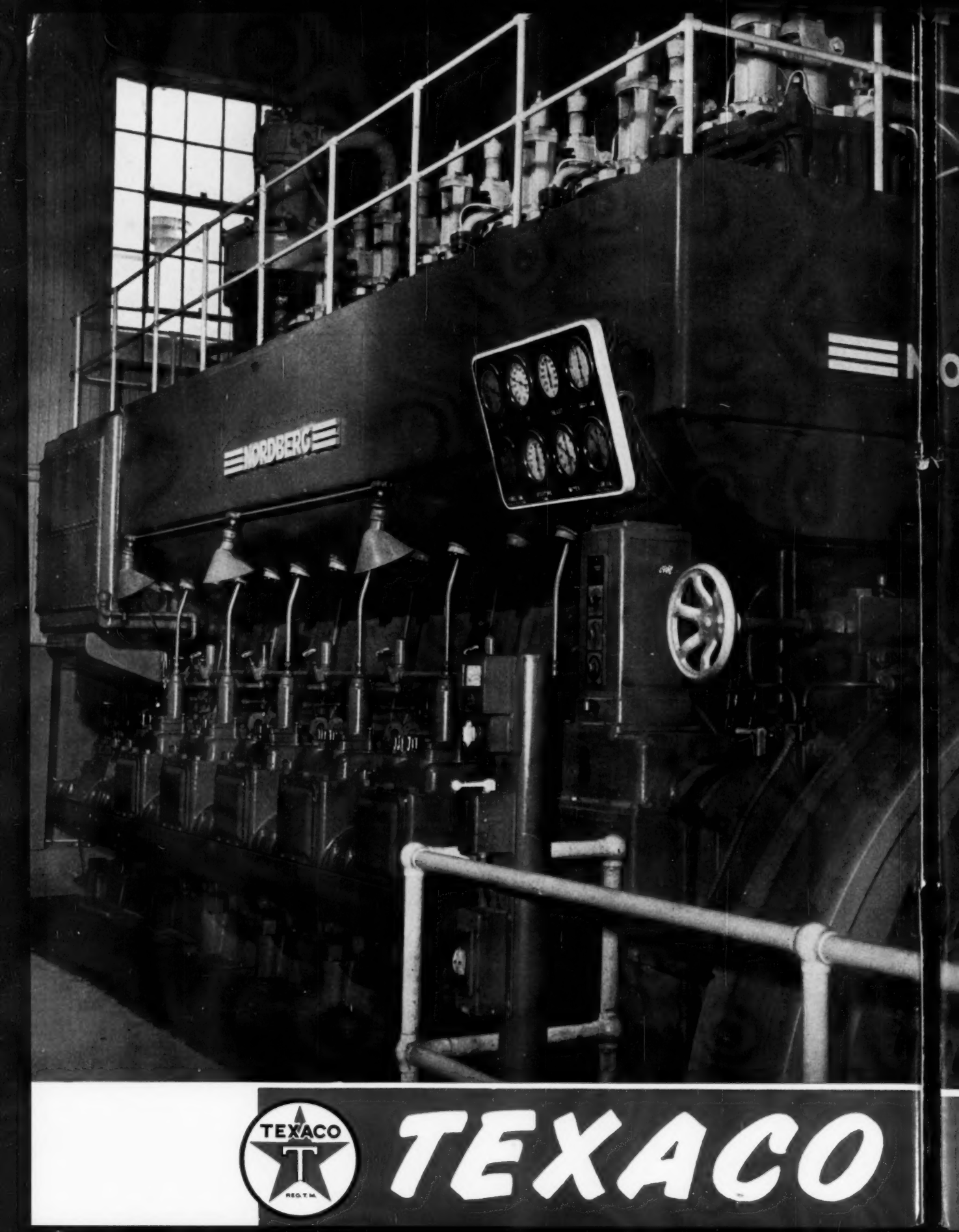
diesel power

July 1957

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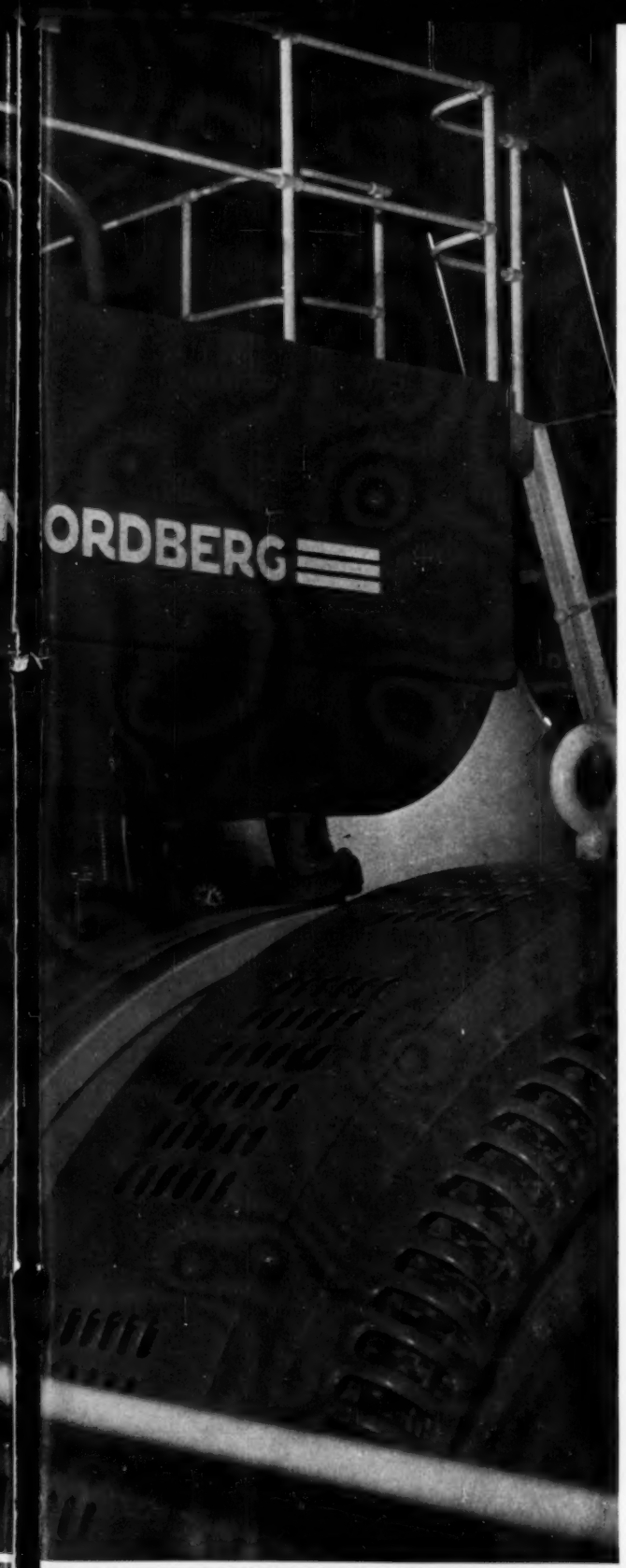


Make sure you get the power you pay for

When fuel and maintenance bills get out of hand and power's not up to par, chances are your oil is the culprit. Let your Texaco Lubrication Engineer recommend the proper grade of *Texaco Ursa Oil.*

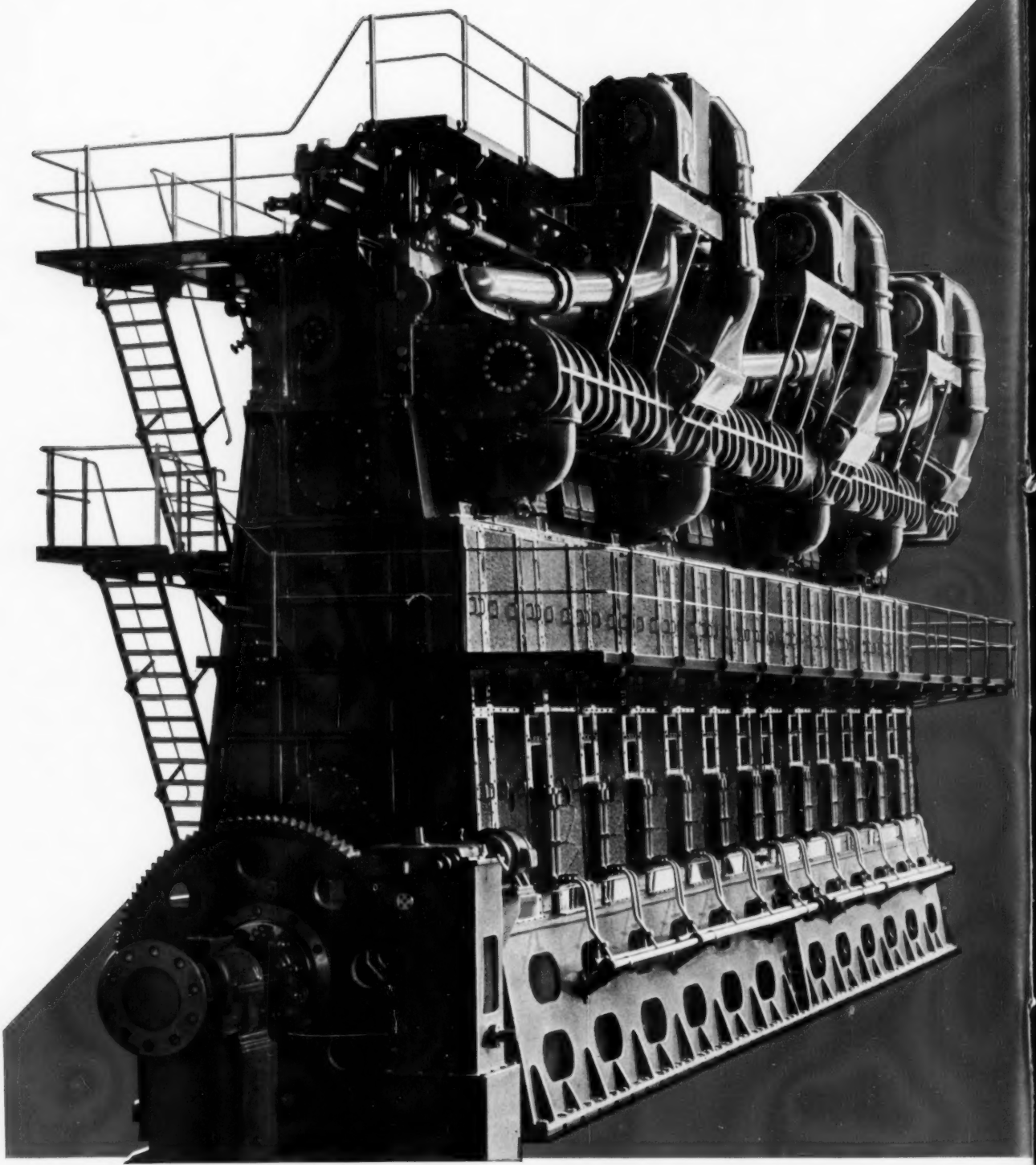
Texaco Ursa Oils keep diesel systems running clean for full compression and complete combustion . . . prevent harmful deposits in the combustion chamber, in crankcase and on valves. They help minimize ring, cylinder and bearing wear—all of which adds up to full power on less fuel and lower maintenance costs.

For over twenty years more stationary diesel horsepower in the United States has been lubricated with Texaco than with any other brand.

There is a complete line of *Texaco Ursa Oils* to meet the requirements of all diesel, gas and dual-fuel engines.

Just call the nearest of more than 2,000 Texaco Distributing Plants in the 48 States—or write The Texas Company, 135 East 42nd Streeet, New York 17, N. Y.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES



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FOUR-STROKE UP TO 4,000 B.H.P.

SUPERCHARGING · HIGH SUPERCHARGING · HEAVY FUEL OIL OPERATION

TWO-STROKE UP TO 15,000 B.H.P.

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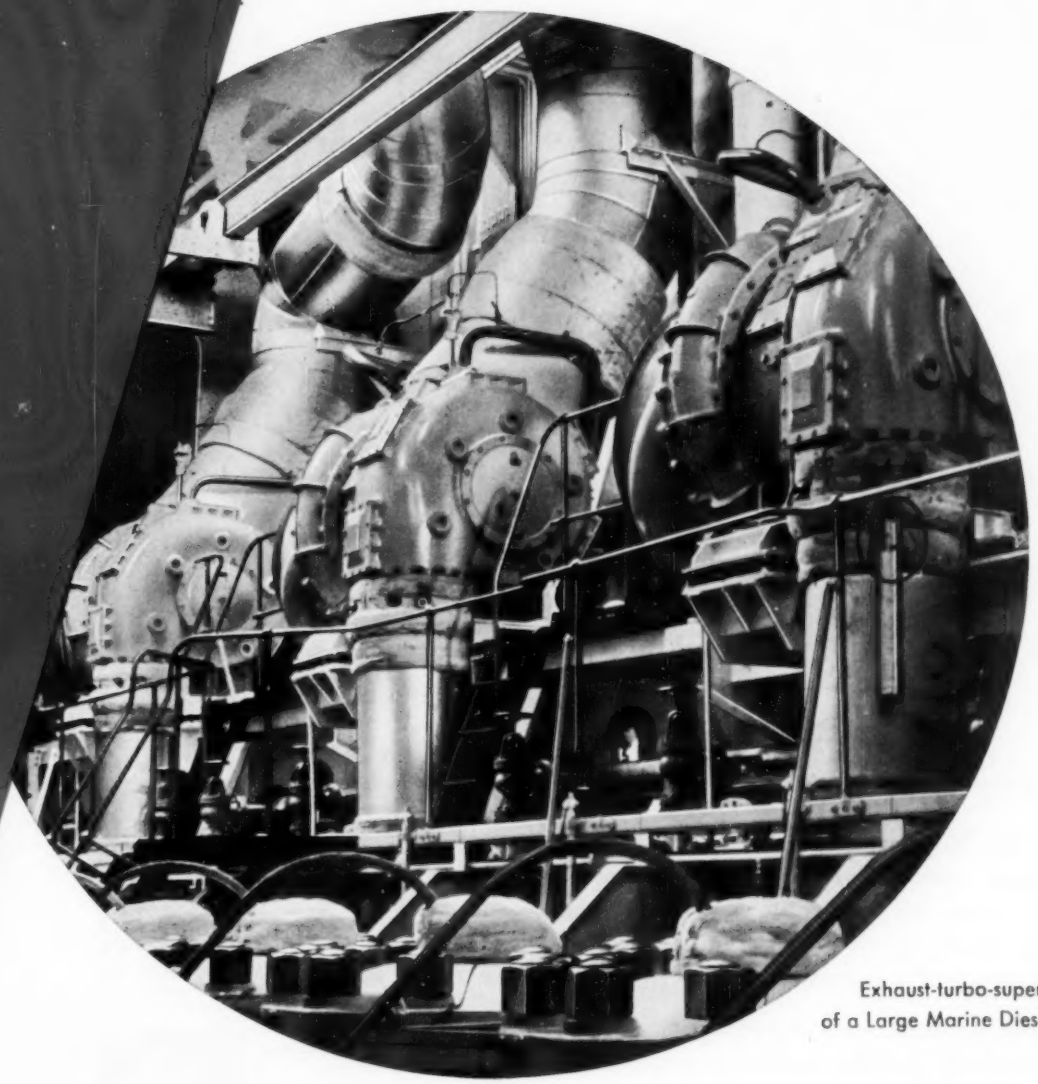
M·A·N



Exhaust-turbo-superchargers
of a Large Marine Diesel Engine

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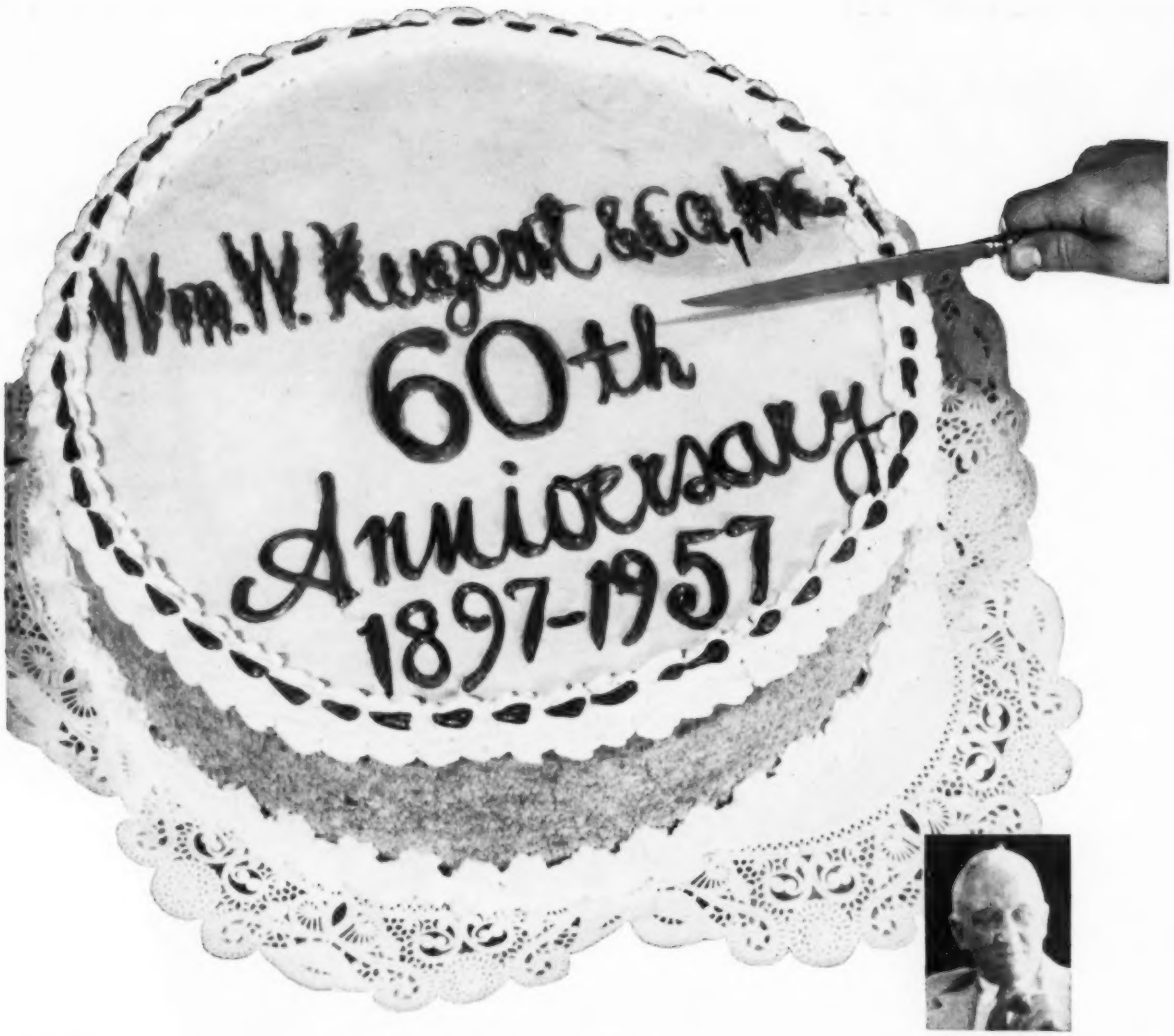

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Founder

CORLISS D. NUGENT
President

WM. WARREN NUGENT
Secretary

Before we cut the cake...

Wm. W. Nugent & Co., Inc., on the occasion of its sixtieth anniversary, wishes to express its sincere appreciation for the confidence and loyalty toward Nugent products, demonstrated by an ever increasing acceptance throughout industry.

For three generations, Nugent products have embodied only highest quality design, materials and workmanship. The future shall find no compromise with that policy.

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diesel power

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Diesel Publications, Inc., 80 Lincoln Avenue, Stamford, Conn.

new LONG LIFE PISTON

Puts CAST IRON WEAR IN TOP RING GROOVE

G and E Wire Insert Piston before machining (left) and after ring grooves are cut (right) showing how the steel wire forms a tough wear-resistant surface on both faces of top ring groove. The patented ferrous plug molded in the head (for diesel pistons) prevents burning through head and lengthens diesel piston life!

G and E WIRE INSERT PISTONS

Patent Pending

★ **Low initial cost— Low cost per mile**

★ **Amazing increase in piston life**

★ **Maintains new engine power and performance**

Here's an entirely new piston design that combines all the advantages of aluminum alloy pistons with the long life of steel in the top ring groove. No noticeable increase in weight. G and E Wire Insert Pistons are real top performers at LOW COST—barely more than ordinary alloy pistons!

This Gillett & Eaton exclusive steel wire insert cuts top ring groove wear and greatly increases mileage between overhauls.

You get longer piston wear at lower cost because G & E Wire Insert Pistons have a pre-shaped steel wire cast right in the piston wall where the top ring is located. When the grooves are machined, this tough wire is cut, exposing the closely spaced hard surfaced bearing points on top and bottom faces of the groove.

GET THE G AND E WIRE INSERT STORY—Ask your White Machine Works "Arrowhead" representative or write to Gillett & Eaton, Inc.

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ESTABLISHED 1868

DIESEL FUEL and LUBRICATION

BULLETIN

CITIES SERVICE

WHAT CAUSES LUBRICATION FAILURES?

The biggest single reason for lubrication failure is improper selection and application of lubricants.

Today's lubricating oils are made for highly specialized purposes. The fact that an oil seems ideal for the requirements of one piece of equipment is no guarantee of its qualifications for other machinery.

For example, choice of an oil with low detergency may result in stuck rings, excess cylinder wear, injector clogging, bearing wear and other diesel difficulties.

Next time you're considering what type of oil to use for a certain piece of equipment, call in a Cities Service Lubrication Engineer. He not only has the precise oil for the particular unit you want to lubricate, but may be able to simplify your entire lubrication picture and reduce maintenance costs as well.

USERS ACCLAIM CITIES SERVICE C-300 OIL

From a strip miner comes this report: "Shovel and dragline work 20 hrs. a day, seven days a week. Each have rolled up over 14,000 hrs. with no major overhaul, using Cities Service C-300 Motor Oil."

From a leading stone company: "Our six stationary diesels, powering our compressors and crushers, have averaged 12,000 hours each before major overhaul, with Cities Service C-300 Oil."

From a trucking company: "Our 20 diesels get up to 225,000 miles before overhaul with Cities Service C-300 Oil. We don't even grind the valves before then."

With excellent oxidation resistance, high detergency, and low carbon residue, Cities Service C-300 Oil may be the perfect lubricant for your machinery, too.

Get the facts from a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

USING A SULPHUROUS FUEL? TRY THIS NEW CITIES SERVICE OIL

If you're using a diesel fuel with high sulphur content, your motor oil must do more than its normal share of work to fight engine deposits.

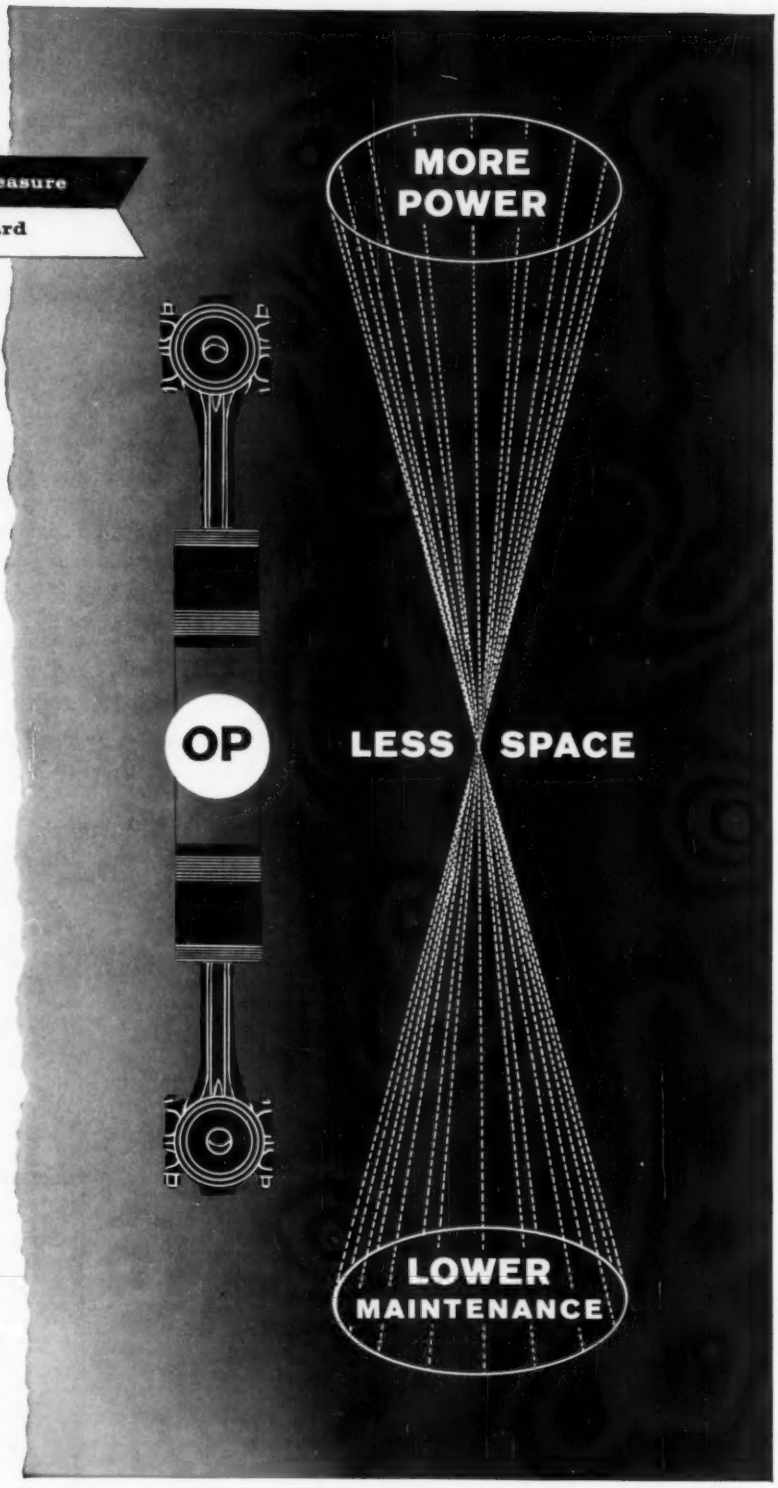
Cities Service C-100 Motor Oil has been formulated for just this purpose. Under dusty, dirty, and sulphurous conditions, it provides excellent engine lubrication and protection. Talk with your Cities Service Lubrication Engineer for details.

MAN YOU SHOULD KNOW

Barney Fleming is the Regional Manager of Industrial Oil Sales at the Cities Service office in St. Paul, Minnesota. With a background of 35 years as a lubrication engineer and a talent for solving problems, he is typical of the Cities Service engineering staff that's at your service. A call to the nearest Cities Service office will bring a member of this staff to your plant or job site.

Where performance is the measure

F-M Power is the standard



Only Fairbanks-Morse Opposed-Piston Diesels offer all these advantages:

Opposed-Pistons . . . of equal weight reacting to combustion in a single cylinder liner producing more power in less floor space with less weight—power that is instantly responsive with practically no vibration.

Two-Cycle Design . . . that completely eliminates more than 40% of the moving—wearing—parts found in engines of comparable horsepower. No cylinder heads, no valves or intricate timing with its attendant adjustments. Fewer parts automatically mean less maintenance. Low B.M.E.P. further reduces wear.

Uniflow Scavenging . . . that eliminates crosscurrents, pockets. Provides greater horsepower, increased thermal efficiency for the utmost in fuel economy.

More Dependable Power...

Insist on an O-P in the 200 to 2400 horsepower class and see what top performance, reliability and economy can mean in dependable power generation. For complete information to get you started, write: Fairbanks, Morse & Co., Dept. DIP-7, Chicago 5, Illinois.

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DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAILCARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS

At Pittsburgh & West Virginia Railway

4 years between overhaul

...cast iron cylinder liner wear only .0045" and .003" per 100,000 miles, when protected with* ***AIR-MAZE*** *oil bath filter*

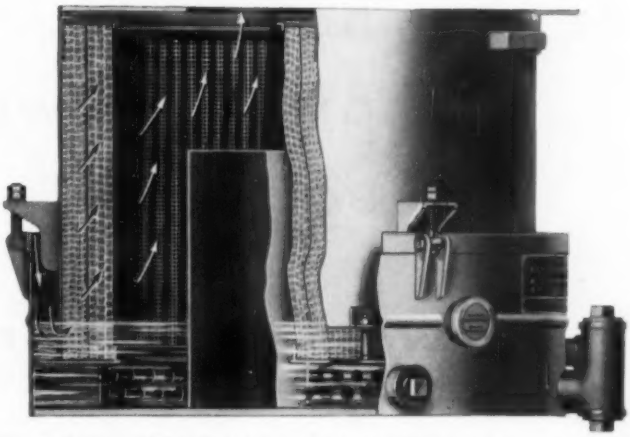
Once it was necessary to overhaul diesels every 18 to 24 months. Now with the Air-Maze oil bath filter, the original oil bath equipped 2000 hp Fairbanks Morse heavy duty unit on this railroad has gone 48 months... 182,000 miles... between overhaul. But that's not all. After 4 years, the original cylinder liners were re-installed without reconditioning.

Prior to the oil bath filter, the engine air receivers were wiped every 30 days. Now, less foreign contaminant is found in the manifold in 90 days of service.

With conventional filters, 6 panels must be removed for cleaning and re-oiling every two weeks. The oil bath filter simply requires checking oil level every 30 days, draining and cleaning the bowl every 90 days.

With the Air-Maze oil bath filter, intake air is thoroughly cleaned in a bath of oil. As a result, its inherently higher filtering efficiency is maintained even at lowest engine speeds.

Contact your engine builder or write us for information. Air-Maze Corporation, Cleveland 28, Ohio. Dept. DP-7.



Air-Maze oil bath filter for cleaning intake air to cut engine wear.

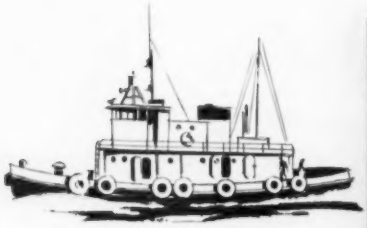
**As this is an opposed-piston type engine, liner measurements were taken at points of maximum wear . . . namely, 19-5/8" from top of liner and 19-9/16" from bottom of liner.*

the biggest names in diesels are protected by Air-Maze filters

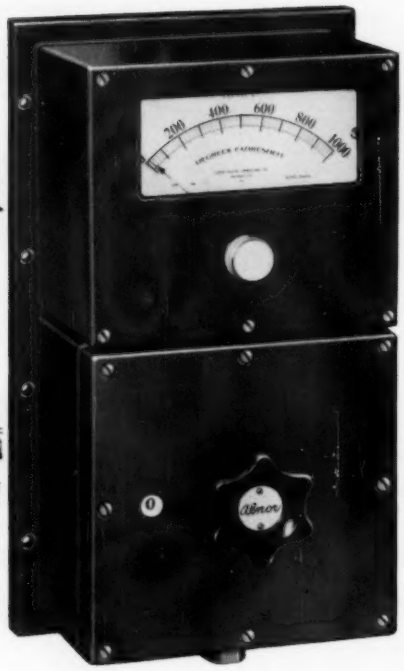
AIR-MAZE

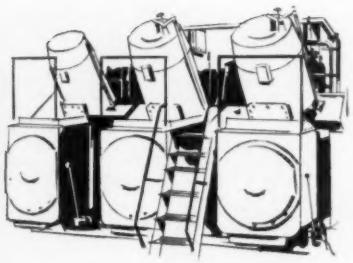
The Filter Engineers

ENGINE AIR FILTERS ● CAR BODY FILTERS ● LUBE OIL FILTERS ● PASSENGER CAR FILTERS

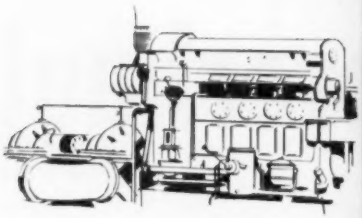


Marine

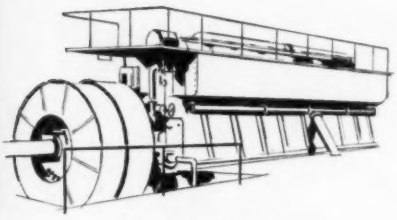




Engine compressor



Pumping



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BEARING STAMINA

In the toughest services, in high duty engines of all kinds, the value of extra bearing stamina really shows up . . . shows up in work records and in satisfied customers. And that's why there is no substitute for the plus performance engineered and manufactured into Monmouth Micro* and Clevite 77* bearings! Made by the world's leading manufacturer of engine bearings. Stocked by N.A.P.A. jobbers everywhere.

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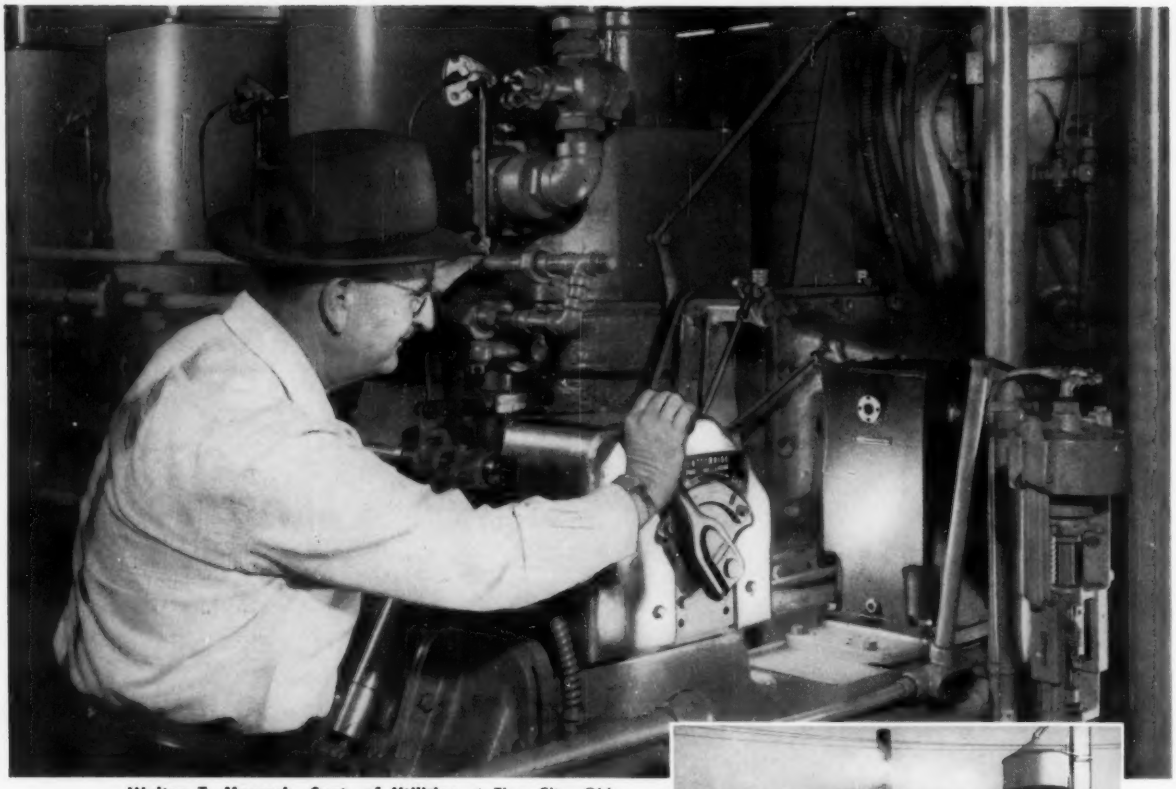


Walter T. Messeck, Supt. of Utilities at Tipp City, Ohio, sets Enterprise "Select-O-Matic" control for Dual Fuel operation.

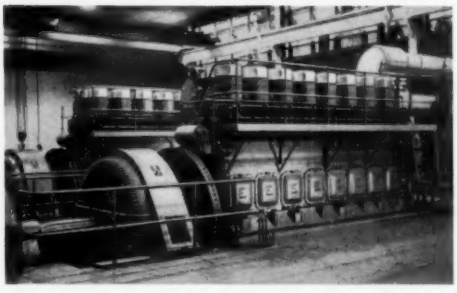
Dual Fuel? Heavy Fuel? Tipp City, Ohio, Profits From Both With Their Two Modern Enterprise Engines

As long as fuel prices fluctuate, and availability of different fuels varies, Enterprise "Select-O-Matic"® Dual Fuel engine systems contribute important savings in power production.

This is the case at Tipp City, Ohio, where they converted their Enterprise Engines from straight diesel operation just two years ago. Dual fuel operation on natural gas and No. 2 diesel pilot fuel is alternated on a seasonal basis, with straight diesel operation using either light or heavy fuel oils, depending on the current market price of the various grades of oil, during the winter months when gas is not available. Gas and heavy fuel operation is economical, and in this business the saving of as little as 1 mill per kilowatt hour amounts to a pretty penny when you're generating 9,488,200 KW hours a year as was the case at Tipp City in 1955.

Let us show you how Enterprise Dual Fuel economy can improve *your* operations. Write today for full information, or call your nearest Enterprise sales and service office.

The Tipp City Diesel Power Plant is a modern show place. Hundreds of visitors have inspected this efficient, well-run operation where two 1755 HP Enterprise Turbo-charged Engines supply all the power. Dual fuel and heavy fuel systems were installed in 1954, to take full advantage of the less expensive fuels available.



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ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL

FIRM C. H. LAWSON, INC.

Using RPM DELO Oil heavy-duty engines outlast equipment

C. H. Lawson, Inc. operates 78 pieces of road building equipment ranging from new to 15 years old, all using RPM DELO Oil. Only one engine has ever required major overhaul and that was not due to lubrication. Firm's chief mechanic, E. C. Miller, says, "RPM DELO Oil has been used exclusively in all our heavy duty engines since 1944. In many cases, it has enabled engines to outlast the equipment." Euclid Earth Mover (above) gets a push from a bulldozer to provide extra traction in wet earth.

TD 24 International (left), one of firm's 12 bulldozers, helps clear the way for a Route 50 by-pass at Riverdale, Maryland. This two year old tractor has operated more than 4,000 hours without engine repairs. Company owner, C. H. Lawson (right), reports that RPM DELO Oil keeps the engines in his equipment in such good shape that—regardless of operating conditions—they average approximately 4 years or 10,000 hours service before even minor repairs are required.

Why RPM DELO Oils reduce wear—prolong engine life

- Oil stays on engine parts—hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrorosion of bearing metals
- Inhibitor resists crankcase foaming

For More Information or the name of your nearest distributor, write or call any of the companies listed below.

LUBRICATING OILS RPM DELO

TRADEMARK "RPM DELO" AND DESIGN REG. U.S. PAT. OFF.

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THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso

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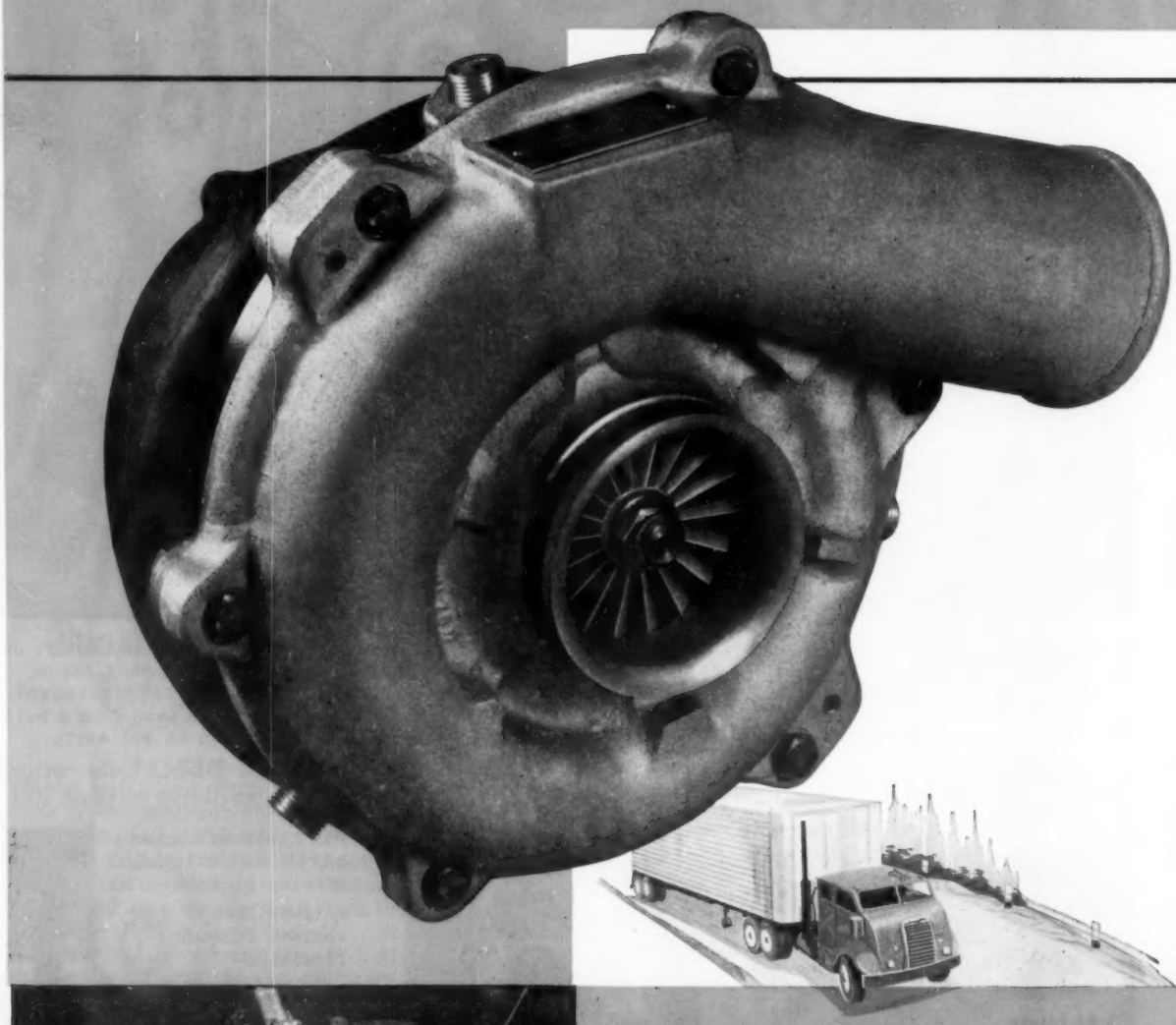
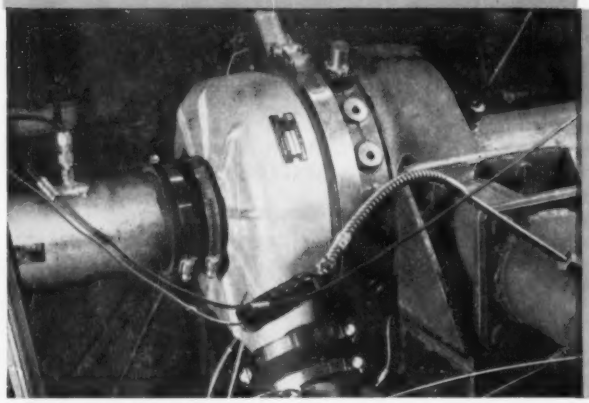
Out of Thompson's





Simulated service-condition lab test of Thompson Turbocharger to determine capacity under varied loads and temperatures.

Aerodynamics Laboratory...

NEW THOMPSON TURBOCHARGER

simpler design, easier to service, longer life

New Thompson Turbocharger for diesel engines up to 500 horsepower combines maximum supercharging effect with a simple rotor design. Problems encountered on other superchargers with oversize shafts, split bearings, and complex diffusers are eliminated on the Thompson Turbocharger.

This new design of supercharger turns at lower speed, yet provides ample compression to meet your supercharging requirements.

For over a half-century, Thompson has been a leading designer and producer of automotive parts. This experience has been combined with our leadership in aerodynamic engineering, to produce the most efficient and simplest design of turbocharger now available for automotive-type diesel engines.

Several sizes of Thompson Turbochargers are available to supply air augmentation for diesel engines up to 500 horsepower. Engineers from the Jet Division will be glad to work with you in providing a Thompson Turbocharger for your present engine design.

This data booklet DP-157 contains information to help you equip your engines with Thompson Turbochargers. Write for it on your company letterhead.

JET DIVISION

Thompson Products, Inc.

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THE FIRST WITH THE MOST

DUALOY PISTONS HAVE

More experience in more applications with
More miles of proven performance in
More makes and more types of engines in
More fleet operations...
than any other
Bi-Metallic Heavy Duty Piston

NIRESIST IRON ARMORED TOP RING BAND INTEGRALLY CAST AND CHEMICALLY BONDED TO ALUMNUM PISTON

DUALOY HAS ESTABLISHED THESE NEW INDUSTRY STANDARDS

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2 Longer Piston life
3 Less down time
4 Positive top ring groove protection

DUALOY

THE 1st BI-METALLIC MOLECULAR BONDED PISTON

Manufactured by

UNITED ENGINE & MACHINE COMPANY

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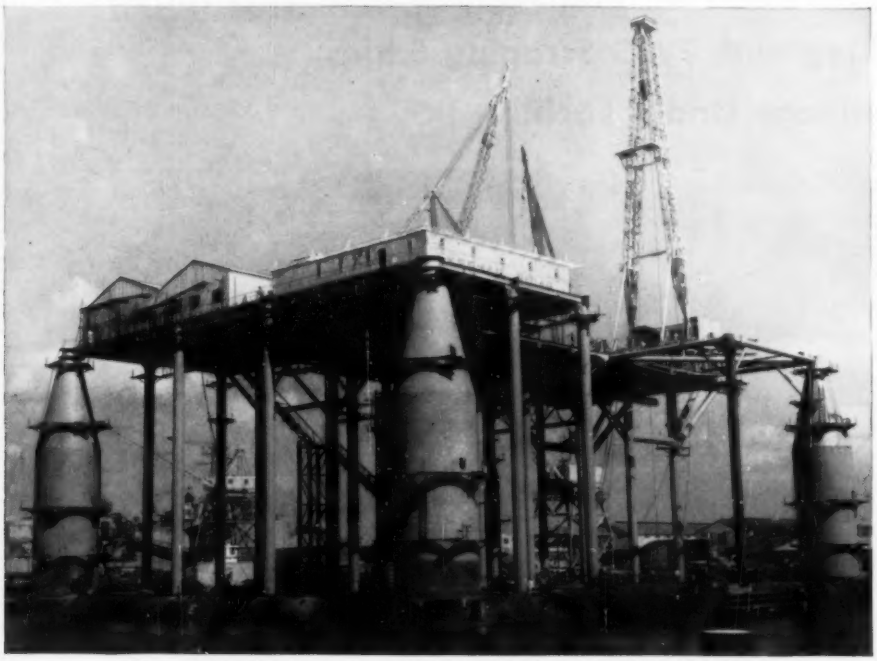
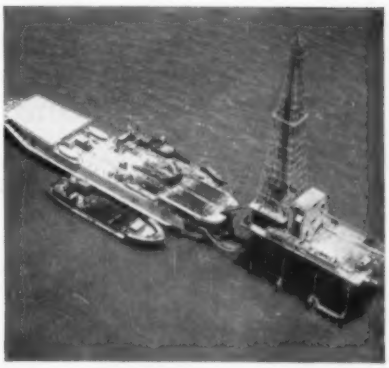
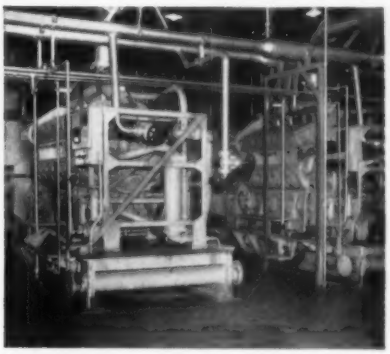
FIRST A TENDER — AND NOW THE GIANTS



Kermac Rig 46 is a new type of giant mobile barge capable of drilling in 70 feet of water. Rig 47, recently launched, is of identical design.



Kermac Tender III and Rig 48—first tender platform to have a complete Diesel-electric power system.



Opposite the drilling platform on Rig 46 are three Electro-Motive 900-hp generating sets. Each of these 8-cylinder engines drives two 500-kw generators and comes complete on skids with air or water cooling, engine and generator controls.

Pioneer Kermac fits new rigs 46 and 47 with ELECTRO-MOTIVE POWER

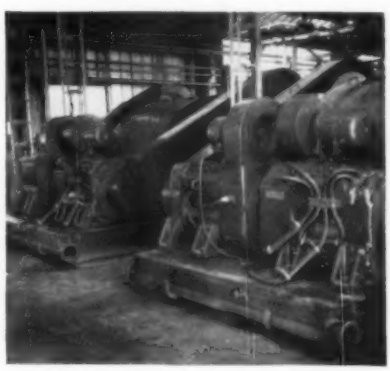
Kerr-McGee Oil Industries, Inc., was the first to operate a tender-platform with a complete Diesel-electric power system. The tender, Kermac III, working with Rig 48 in the West Delta Area has demonstrated its ability to make hole fast—recently drilled to 14,088 feet in 67 days.

Kermac III is powered by two Electro-Motive 900-hp generating units that team with a third on Rig 48 to power electric drive motors on draw works, rotary and mud pumps.

Kermac's new giants—Rigs 46 and 47—are of radically new design, yet their power is the same as that for Kermac III and Rig 48. The reason? Flexible electric cables between generating units and drive motors permit complete freedom of power arrangement. Thus, rigs can be designed to requirements without restrictions due to alignment.

Power to make hole fast; flexible to meet varying drilling conditions; simple, accurate controls; matched components, designed and built by one manufacturer—these are reasons why more offshore rigs use Electro-Motive Power than any other Diesel-electric drilling system.

Both land and offshore rigs are successfully reducing drilling time and costs with Electro-Motive Power. See or call your Electro-Motive representative for complete information.



Typical arrangement of Electro-Motive 625-hp dc drive motors with mud pumps is shown on Rig 46. Similar motors on the draw works are equipped with the new Super-Excitation control which provides a braking action when power is removed.

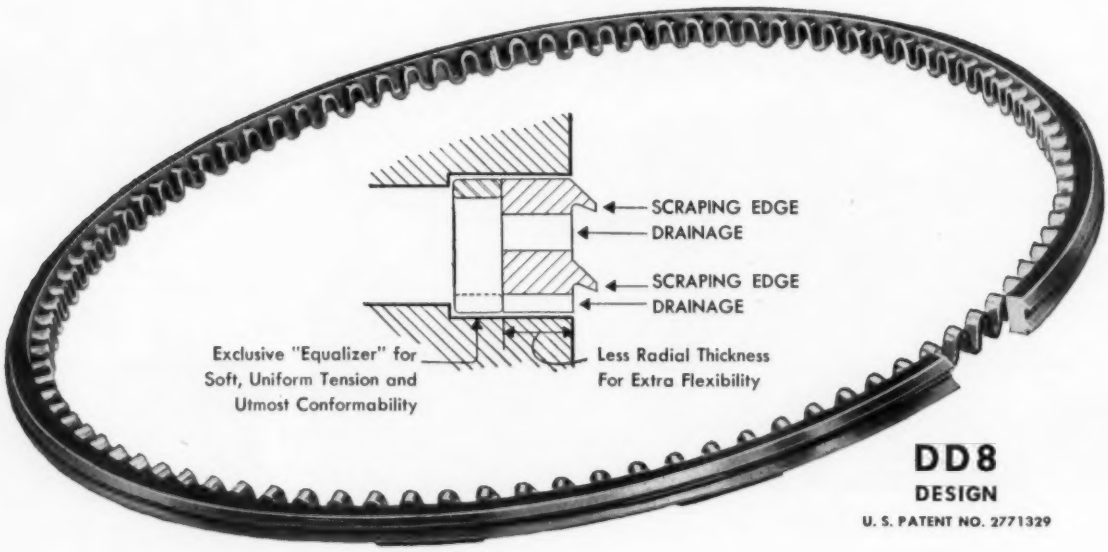
ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS · *In Canada:* General Motors Diesel Limited, London, Ontario

Petroleum industry sales offices: Dallas and Houston, Texas; Morgan City, Louisiana; Los Angeles, California.

Another PEDRICK *"First"*

A Single-Piece Cast Iron Conformable Oil-Control Piston Ring with TWO Scraping Edges and Drainage Under Each!



Pedrick Conformable FORMFLEX Double-Drain Oil Ring

Pedrick's DD8 Formflex oil ring assures far better oil control, especially on pistons with oil drainage through the grooves instead of below the grooves. Three of the most important reasons are:

1. TWO oil-scraping edges.
2. TWO sets of drainage channels or slots, one under each scraping edge.
3. Exceptional *conformability* for positive contact with the cylinder wall under even the most severe conditions.

Conformability is assured because of Pedrick's exclusive "Equalizer," a special design of steel expander which exerts a uniform pressure all the way around the cast-iron cylinder-contacting ring. The radial thickness of the cast-iron ring is less also, which increases its flexibility.

The Pedrick FORMFLEX Double-Drain DD8 oil ring, therefore, provides quicker, more effective drainage, and increased performance efficiency in all piston-groove styles. It is easy to install and moderate in cost.

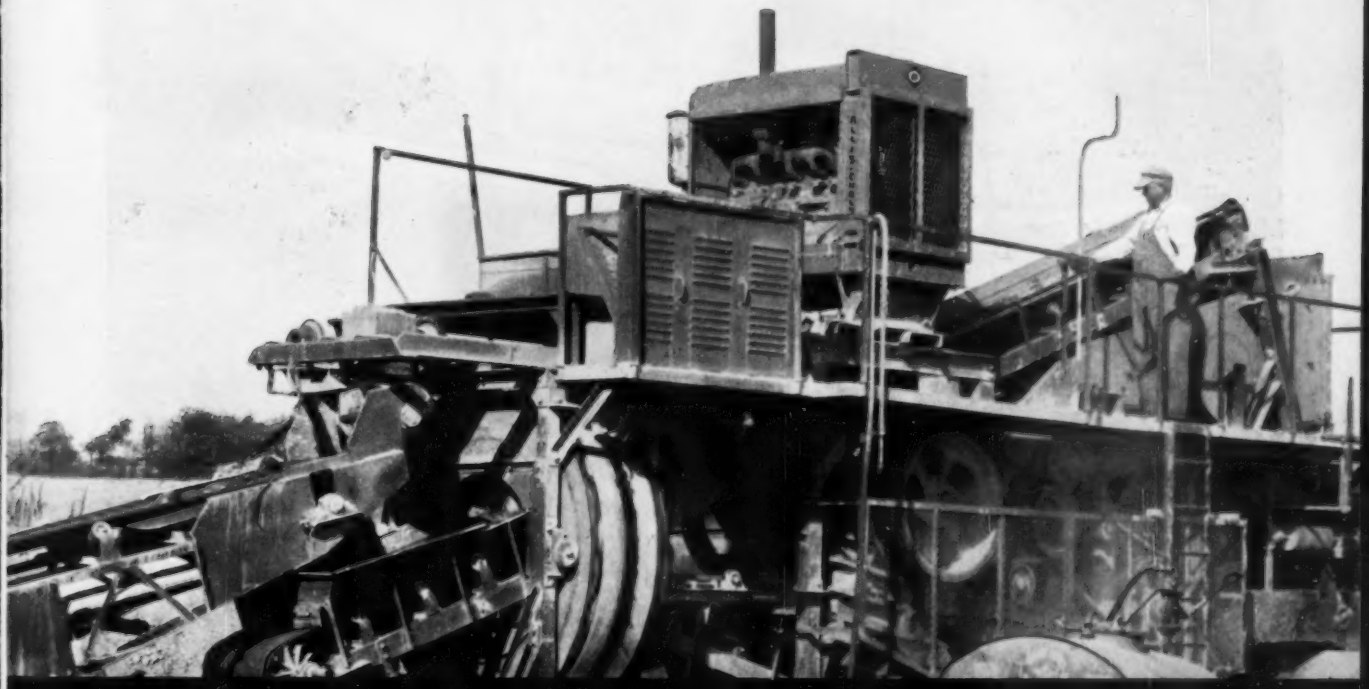
This is just one of a family of top-flight ring designs which Pedrick has available to assure you long dependable, low-cost engine operation. Say the word and our engineers will be glad to consult with you. WILKENING MANUFACTURING CO., Philadelphia 42 and Toronto 2.

Pedrick PISTON RINGS

PEDRICK PIONEERED *Conformable* RINGS FOR BIG-BORE ENGINES

"I like it the best of any engine we have had—wish we had one on the shovel," says the job superintendent about the Allis-Chalmers 6DA-844 diesel powering this crusher.

With 30 to 50% fewer moving parts, this Allis-Chalmers diesel...



...PUTS MORE ROCK THROUGH THE CRUSHER

THERE IS UNUSUAL SIMPLICITY in Allis-Chalmers engines. The 6DA-844 diesel shown working above, for instance, *has 30 to 50 percent fewer wearing parts than competitive engines!*

THAT MEANS LESS WEAR . . . LESS THAT CAN GO WRONG when parts are fewer and stronger. Your equipment keeps working; you get more rock through the crusher.

MORE POWER GOES TO WORK with Allis-Chalmers engines — not only because there are fewer moving parts, but because more efficient combustion means maximum power from the fuel.

You can have this simplicity, economy and durability in Allis-Chalmers engines of *any* size or type, 9 to 516 hp — *any* fuel, LP or natural gas, gasoline or diesel — for *any* application. See your Allis-Chalmers dealer for full information. Allis-Chalmers, Buda Division, Milwaukee 1, Wisconsin. BC-7

ALLIS-CHALMERS *Engineering in Action*

SUPERIOR 1400-H. P. DIESEL AND BENDIX INJECTION PUMPS

CUT FUEL COSTS 53%

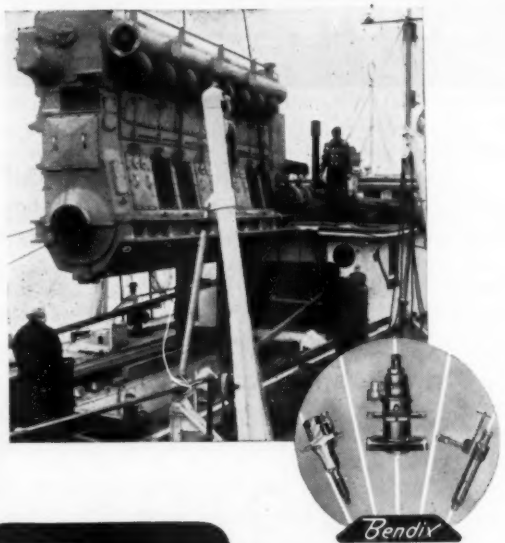
When Straits Towing, Limited, of Vancouver, B. C., repowered its eleven-year-old tugboat, the "Johnstone Straits", with a new 1400-H. P. White Superior diesel using Bendix* injection pumps, remarkable operating savings were immediately effected.

With this new and efficient diesel equipment, the "Johnstone Straits" now operates almost exclusively on low-cost bunker fuel with an amazing reduction of 53% on fuel costs. Previously most marine operations on bunker fuel had been restricted to large diesels of 2500 to 10,000 H. P. operating at 100 to 200 r.p.m.

The "Johnstone Straits" is in service on the British Columbia coast and is used to tow heavily loaded ore barges and to haul huge log rafts over a 600-mile run.

Here, indeed, is another example of how Bendix injection pumps and White Superior diesels cut costs and maintain efficiency on even the most rugged jobs.

That's why you will find that wherever the job requires completely dependable service at low operating cost, Bendix is the choice for fuel injection equipment. *REG. U.S. PAT. OFF.



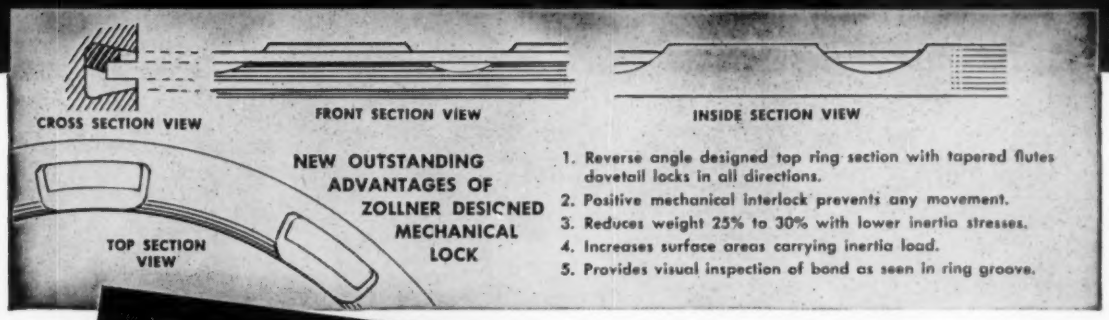
SCINTILLA DIVISION OF BENDIX AVIATION CORPORATION, SIDNEY, N. Y.
Export Sales and Service: Bendix International Division, 205 East 42nd St., New York 17, N.Y.

Scintilla Division
SIDNEY, N. Y.

Bendix
AVIATION CORPORATION

BOND-O-LOC* PISTONS

WITH "NI-RESIST" IRON TOP RING SECTION


CROSS SECTION VIEW
FRONT SECTION VIEW
INSIDE SECTION VIEW
TOP SECTION VIEW
NEW OUTSTANDING ADVANTAGES OF ZOLLNER DESIGNED MECHANICAL LOCK
1. Reverse angle designed top ring section with tapered flutes dovetail locks in all directions.
2. Positive mechanical interlock prevents any movement.
3. Reduces weight 25% to 30% with lower inertia stresses.
4. Increases surface areas carrying inertia load.
5. Provides visual inspection of bond as seen in ring groove.

Double Bonded

METALLURGICALLY Al-Fin Bond

MECHANICALLY Zollner Lock

STOPS!

RING GROOVE WEAR IN HEAVY DUTY SERVICE

"Sensational mileage" is the unanimous report of heavy duty engine builders and transport operators using Zollner "Bond-O-Loc" Pistons. Another great development by Zollner engineers, this super-mileage piston has a "Ni-resist" top ring groove section *permanently* incorporated with the *double* bond of *both* Al-Fin metallurgic *and* the exclusive Zollner mechanical lock. Separation failure is impossible. Ring groove wear problems are eliminated, blow-by prevented, oil consumption minimized, mileage to overhauls greatly increased. We suggest an immediate test of these sensational advantages for your engine.

Licensed under Patents 2,396,730; 2,455,457; 2,550,879

*T. M. Reg. Pat. App. For

ADVANCED ENGINEERING

PRECISION PRODUCTION

COOPERATION with Engine Builders

ZOLLNER PISTONS

THE ORIGINAL EQUIPMENT PISTONS

ZOLLNER

ZOLLNER • Fort Wayne, Indiana

Mining (Rock & Gravel) . . . Caterpillar D7 Tractor
Roadbuilding . . . Caterpillar DW21 and D8 Tractors
Grading . . . Adams "550" Grader
Construction . . . Caterpillar D8 Tractor
Excavating . . . Marion 111 Shovel
Arch Logging . . . Caterpillar D8 Tractor

they've all got this in common...

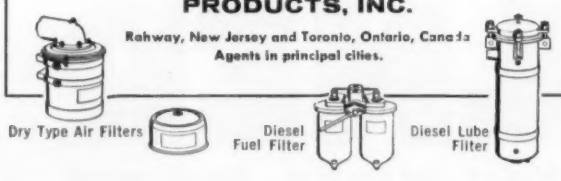
protection from dirt with Purolator filters

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

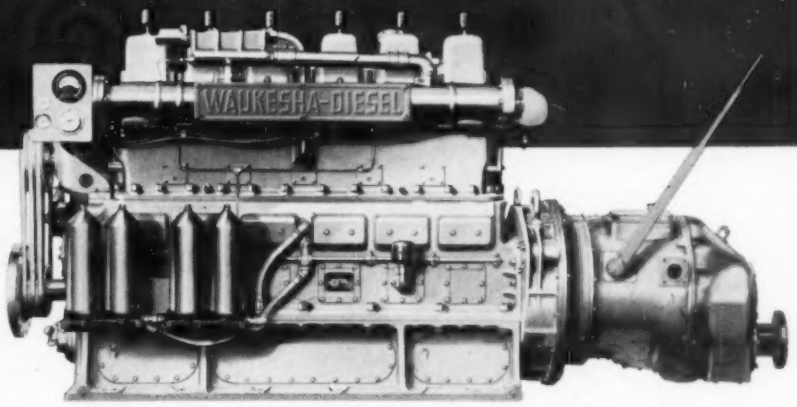
Rahway, New Jersey and Toronto, Ontario, Canada
Agents in principal cities.



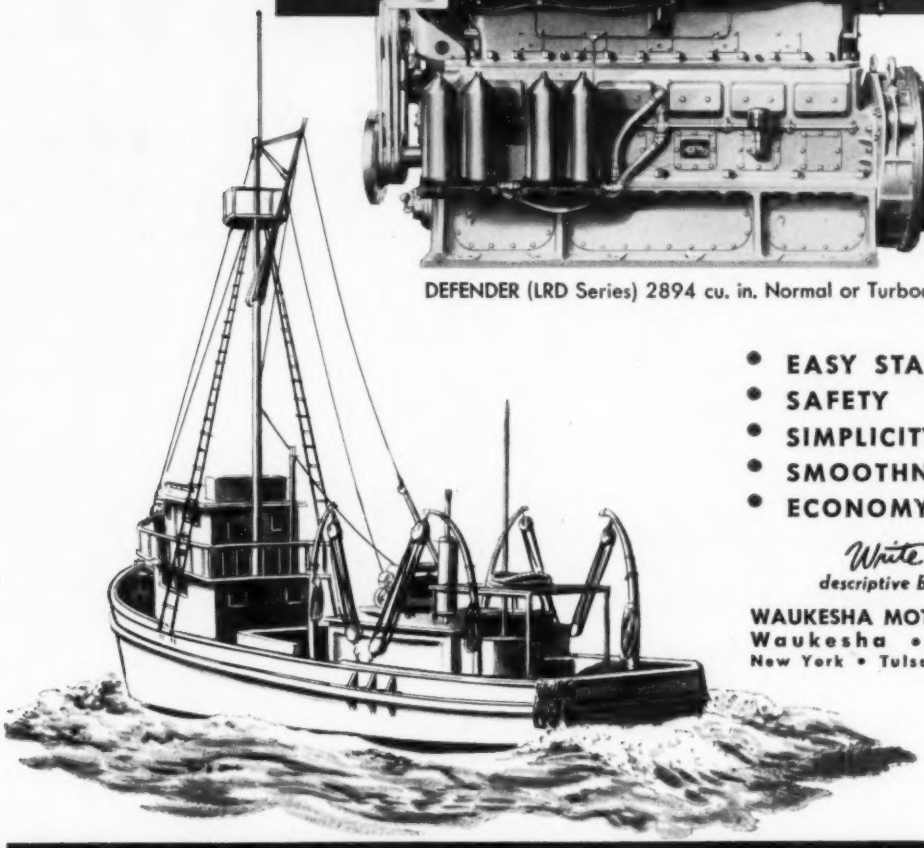
When several manufacturers install the same line of filters on a wide variety of equipment, there must be a good reason. For all the equipment shown above the reason is simply this: Purolator filters remove more dirt. That's all there is to it. In terms of engine wear, performance, and long life, this can mean the difference between dependable operation and breakdown. That's why more and more manufacturers of equipment which must operate in dirt and dust insist on the extra percentage of protection given by Purolator filters. Purolator's complete line for construction equipment includes filters for air, fuel, lubrication oils, and hydraulic systems; plus a complete line of screens and strainers.

WAUKESHA Diesel

MARINE ENGINES up to 990 hp



DEFENDER (LRD Series) 2894 cu. in. Normal or Turbocharged DIESEL



- EASY STARTING
- SAFETY
- SIMPLICITY
- SMOOTHNESS
- ECONOMY

Write for detailed descriptive Bulletin 1691

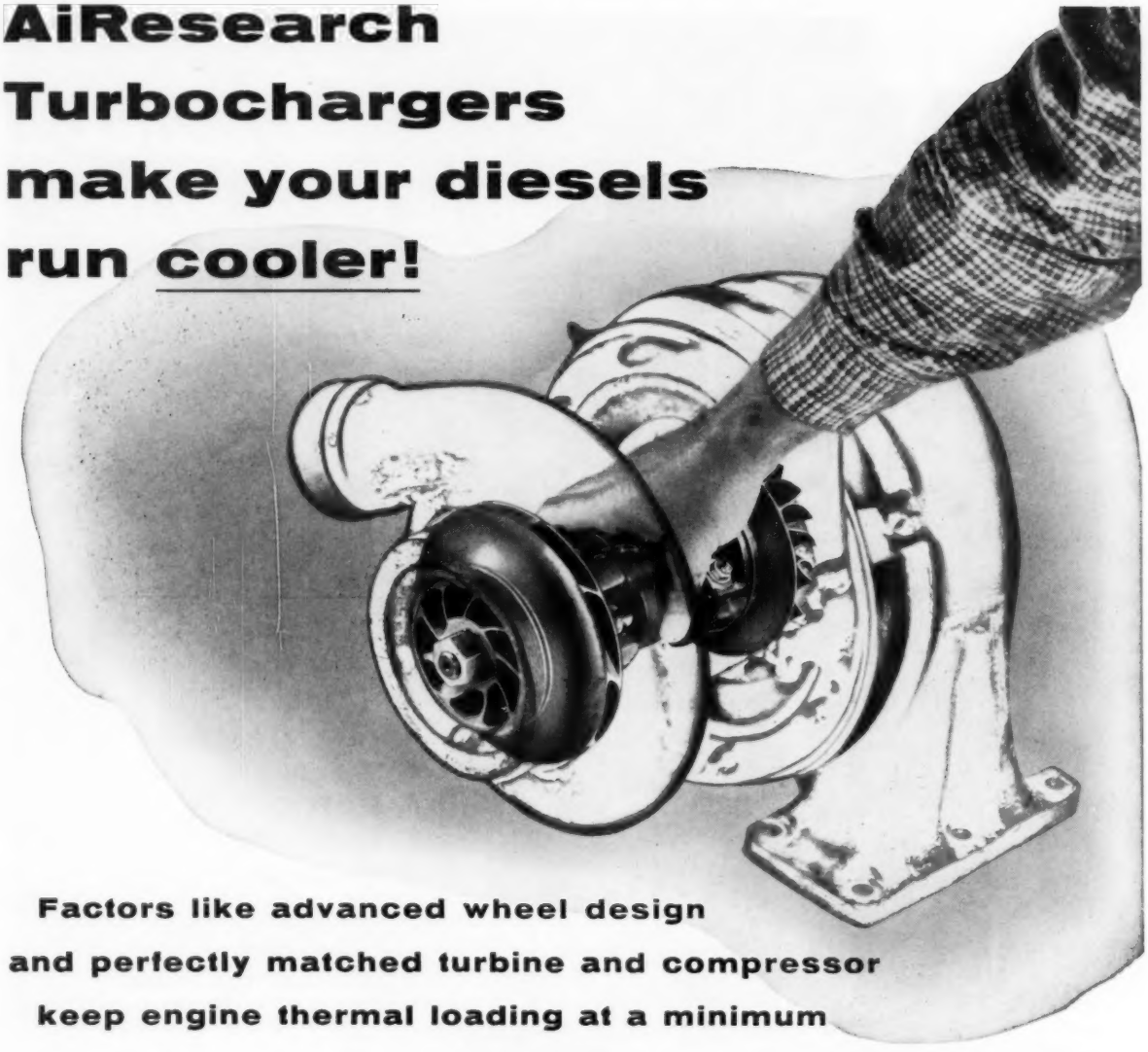
WAUKESHA MOTOR COMPANY
Waukesha • Wisconsin
New York • Tulsa • Los Angeles

342-R

WAUKESHA normal and turbocharged diesel marine engines

Engine Model	Engine Type	No. Cyls.	Bore and Stroke	Displ. Cu. In.	MAXIMUM RATING 24-Hour Duty
Reliance	Normal	12	8½ x 8½	5788	665 horsepower @ 1200 rpm
	Turbo	12	8½ x 8½	5788	990 horsepower @ 1200 rpm
Defender	Normal	6	8½ x 8½	2894	335 horsepower @ 1200 rpm
	Turbo	6	8½ x 8½	2894	480 horsepower @ 1200 rpm
Wanderer	Normal	6	7 x 8¼	1905	240 horsepower @ 1200 rpm
	Turbo	6	7 x 8¼	1905	315 horsepower @ 1200 rpm
Resolute	Normal	6	6¼ x 6½	1197	195 horsepower @ 1600 rpm
	Turbo	6	6¼ x 6½	1197	260 horsepower @ 1600 rpm
Vigilant	Normal	6	5¼ x 6	779	150 horsepower @ 1800 rpm
	Turbo	6	5¼ x 6	779	195 horsepower @ 1800 rpm
Cutwater	Normal	6	4¼ x 5	426	100 horsepower @ 2000 rpm
	Turbo	6	4¼ x 5	426	120 horsepower @ 2000 rpm

AiResearch Turbochargers make your diesels run cooler!



Factors like advanced wheel design and perfectly matched turbine and compressor keep engine thermal loading at a minimum

So effective is the AiResearch turbocharger that it provides power gains while actually lowering the heat level of the engine.

Ambient air is compressed with an efficiency as high as 82%, feeding a maximum weight of air into the cylinders at the lowest possible temperature.

Results: maximum power gain at minimum fuel cost; complete combustion with elimination of objectionable smoking; low engine thermal loading insuring long, trouble-free operation.

All AiResearch turbochargers are air cooled, placing no added burden on the diesel cooling system and requiring no complicated plumbing. The rotating assembly is removable as a unit, simplifying in-the-field maintenance. This advanced design evolved from the most extensive experience in the field of small turbomachinery in America.

Your inquiries are invited.

BASIC SPECIFICATIONS FOR AIRESEARCH TURBOCHARGERS

MODEL	F-51	C-60	A-60	E-100	B-100
Diameter — in. nom.	10	11.5	15.25	15.1	15.4
Length — in.	10.5	12.9	16.75	14.7	17.1
Weight — lb.	40	95	125	112	135
Output — lb/min. (Standard Conditions)	29-51	30-60	38-60	50-100	60-100

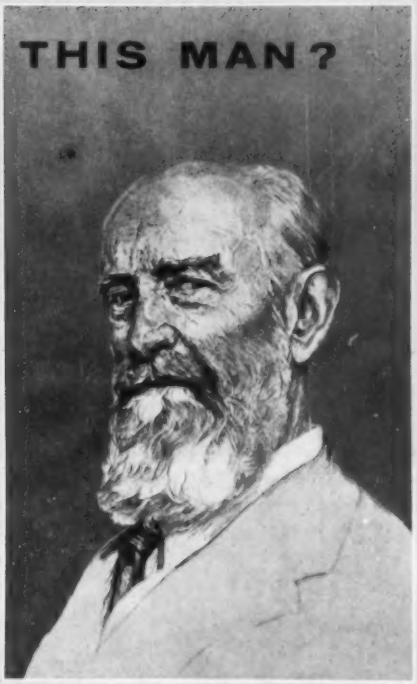
THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND SPECIALIZED INDUSTRIAL PRODUCTS

DO YOU RECOGNIZE THIS MAN?

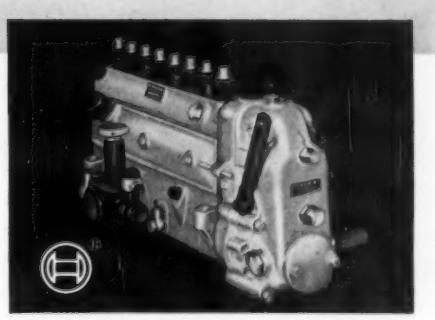


He made the high speed Diesel engine practicable.

Fuel injection equipment bearing his trademark has no peer for precision, quality, long-use dependability.

His name is Robert Bosch.

Millions of Robert Bosch Fuel Injection Pumps have been produced in the past 30 years. Their service facilities are nation-wide, world-wide. Here and abroad, leading engine manufacturers are selecting Robert Bosch Fuel Injection Equipment for their most advanced designs.



+ + + + + + + + + +

First in Gasoline Injection too!

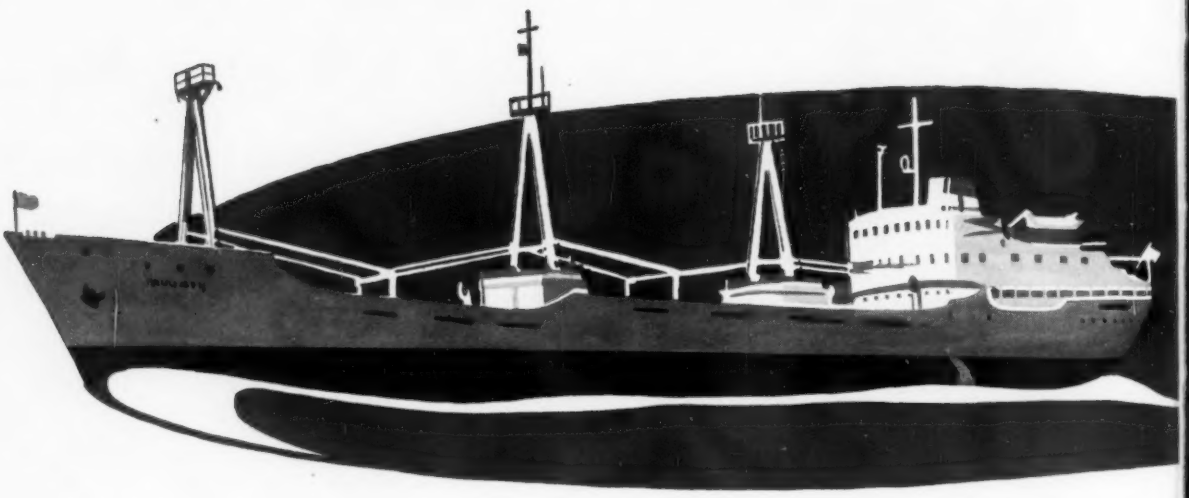
Spectacular records in power, speed and economy have been achieved with Robert Bosch Gasoline Injection Equipment.

ROBERT BOSCH CORPORATION

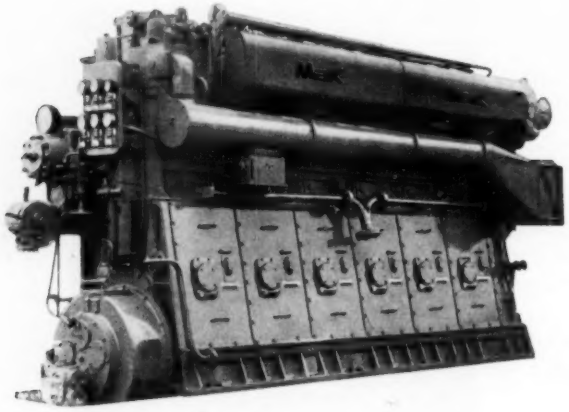
268 Fourth Ave., New York 10, N. Y. 225 Seventh St., San Francisco 3, Calif.

Sales and Service Representatives for products manufactured by Robert Bosch GMBH, Stuttgart

MaK ENGINES IN MODERN SHIPS



Not without some cause MaK Diesel engines are increasingly employed as main engine and servomotor for the construction of new ships at home and abroad.
The special construction as 6-, 8-, 9- and 10-cylinder engines with and without supercharging equipment is particularly appropriate for the use in type boats.
The favourable power output per liter of our engines combined with a low consumption of fuel provides a good economy.
MaK engines of series M 582 type as shown on the picture below have also been used with great success for the installation in ships up to 10,000 tons with multimotor and Diesel electric drives.



Some technical data of the series M. 582 type engine are set out below.

Further details are available on application.

Four stroke type, direct injection 750-1920 b.h.p.

Revolution up to 300 r.p.m.

Bore 385 mm. Stroke 580 mm

Mean piston speed: 5,8 m/sec.

Individual fuel pumps, sturdy tie rod construction, cylinders supported on columns.

Service workshops are available and contract work is also undertaken at many sea and inland harbours.

MaK

MASCHINENBAU KIEL AKTIENGESELLSCHAFT

There is NO SUBSTITUTE for a forging: NO SUBSTITUTE for Wyman-Gordon Experience

There is more to the superiority of the forged crankshaft than just strength.

No other method of fabrication can compare with the forging process for dependability. The uniformity and predictability of physical properties with minimum variance from piece to piece or from one location to another in the same piece is assured to the greatest degree by modern forging practice.

Top automotive engineers agree that the use of a forged crankshaft permits the design of a more compact engine which is a decided advantage when thinking in terms of limited space available and overall engine weight reduction.

As compression ratios increase and engine outputs go up the risk factor must be reduced. Again, the uniformity of quality in the backbone of the engine, the crankshaft, is most essential and made possible only by a forging.

There is NO SUBSTITUTE for a forging and in a forging there is NO SUBSTITUTE for WYMAN-GORDON quality and experience.

WYMAN-GORDON COMPANY

Established 1883

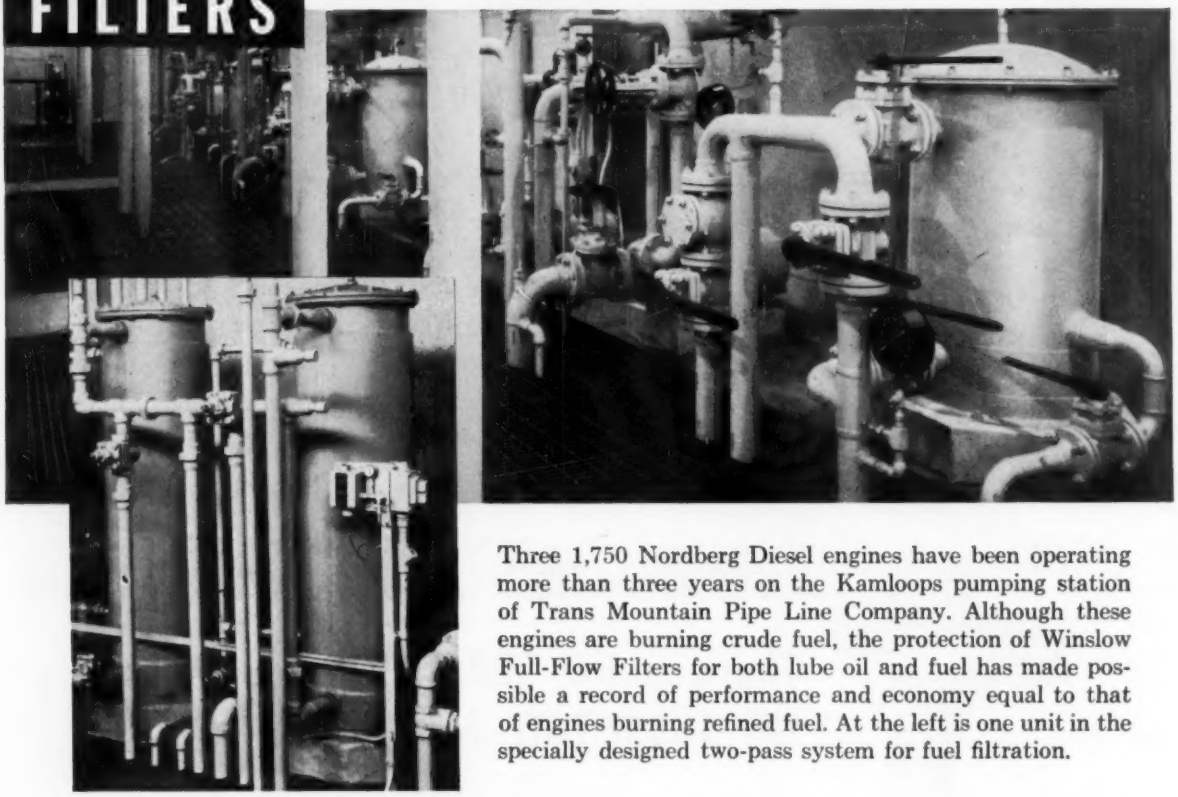
FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER 1, MASSACHUSETTS

HARVEY, ILLINOIS • DETROIT, MICHIGAN

WINSLOW *Full-Flow* FILTERS

Case History Report No. 34 Shows Why Engines Protected by WINSLOW FILTERS Last Longer



Three 1,750 Nordberg Diesel engines have been operating more than three years on the Kamloops pumping station of Trans Mountain Pipe Line Company. Although these engines are burning crude fuel, the protection of Winslow Full-Flow Filters for both lube oil and fuel has made possible a record of performance and economy equal to that of engines burning refined fuel. At the left is one unit in the specially designed two-pass system for fuel filtration.

20,000 HOURS OPERATION—Parts Replaced ONLY $300

CP* FILTRATION

Winslow patented CP* (Controlled Pressure) elements are designed to continuously self-adjust the pressure within the filter and allow for a full stream of filtered oil without opening by-pass valves. This is accomplished through the dual flow capacity, with two types of material.

After 20,000 hours operation in a three-year period, the first Nordberg Diesel in a Trans Mountain Pipe Line station was recently overhauled. In spite of the use of crude fuel, and difficult operating conditions, the engine was in such good condition that only $300 worth of replacement parts was required. This is another striking example of the long engine life and the substantial savings in overhaul time and replacement costs when dirt, acid, moisture and other impurities are removed by Winslow Filters. Standard or special installations of Winslow Full-Flow Filters can give you equal engine economies. Please write for complete information.

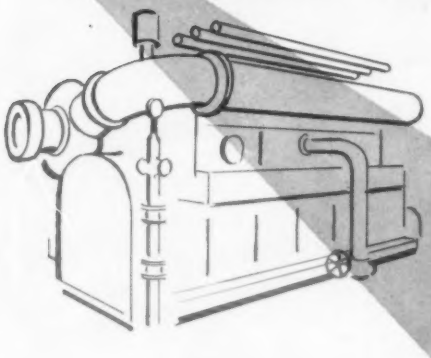
CP* *is fully protected by patents and trademarks*

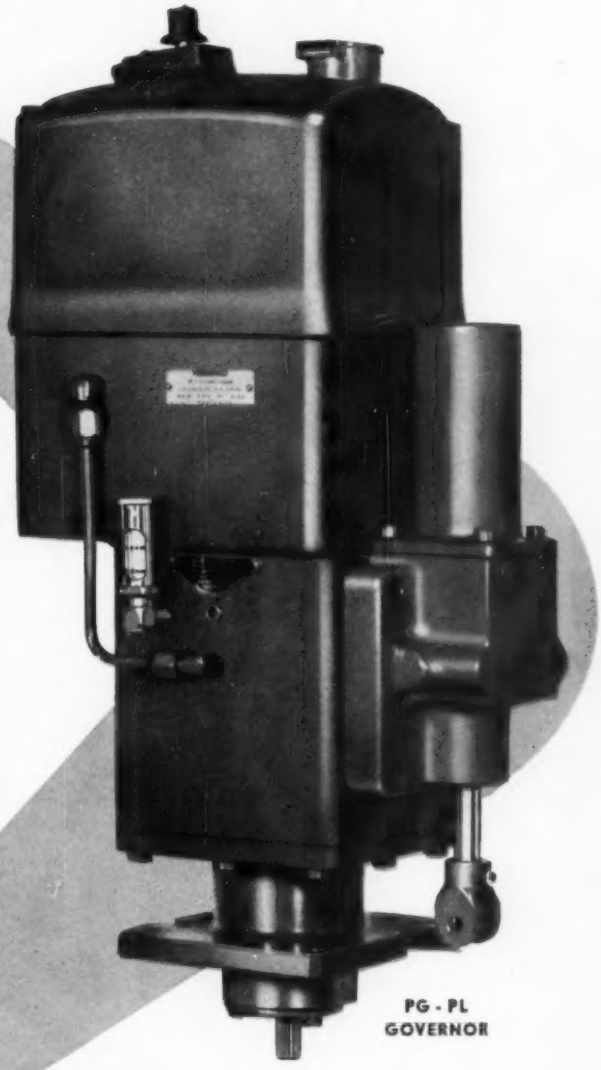
WINSLOW ENGINEERING & MANUFACTURING COMPANY

4069 Hollis Street, Oakland, California

WOODWARD GOVERNORS

For Diesel Driven Pumps and Compressors





PG - PL GOVERNOR

The Woodward PG-PL Governor is one of many special purpose variations of the basic Woodward PG Governor. It was first used on pipelines but its use is now much more general.

When automatic control of engine speed setting is desired the PG-PL Governor is superior in most ways to other methods of automatic speed setting. The use of the PG-PL Governor is also advised for manual remote speed setting in locations where the use of electrical devices is prohibited. It is also advantageous for sugar mills, marine engines and other special applications.

Receiving its control air pressure from a suitable air controller the PG-PL Governor will control an engine at any speed necessary to maintain constant output-pressure, suction pressure, differential pressure, flow, suction pressure (with an override if discharge pressure becomes excessive), and any other quantity that can be measured by air controllers. The same air signal can adjust several engines simultaneously.

The PG-PL Governor is suitable for completely unattended operation if desired. Special modifications are available for hard to control engines. Woodward engineers are always ready to help you solve difficult problems of control.

WRITE FOR DETAILS ON OUR UNIT EXCHANGE PLAN

Give serial number of typical governor when requesting any information.

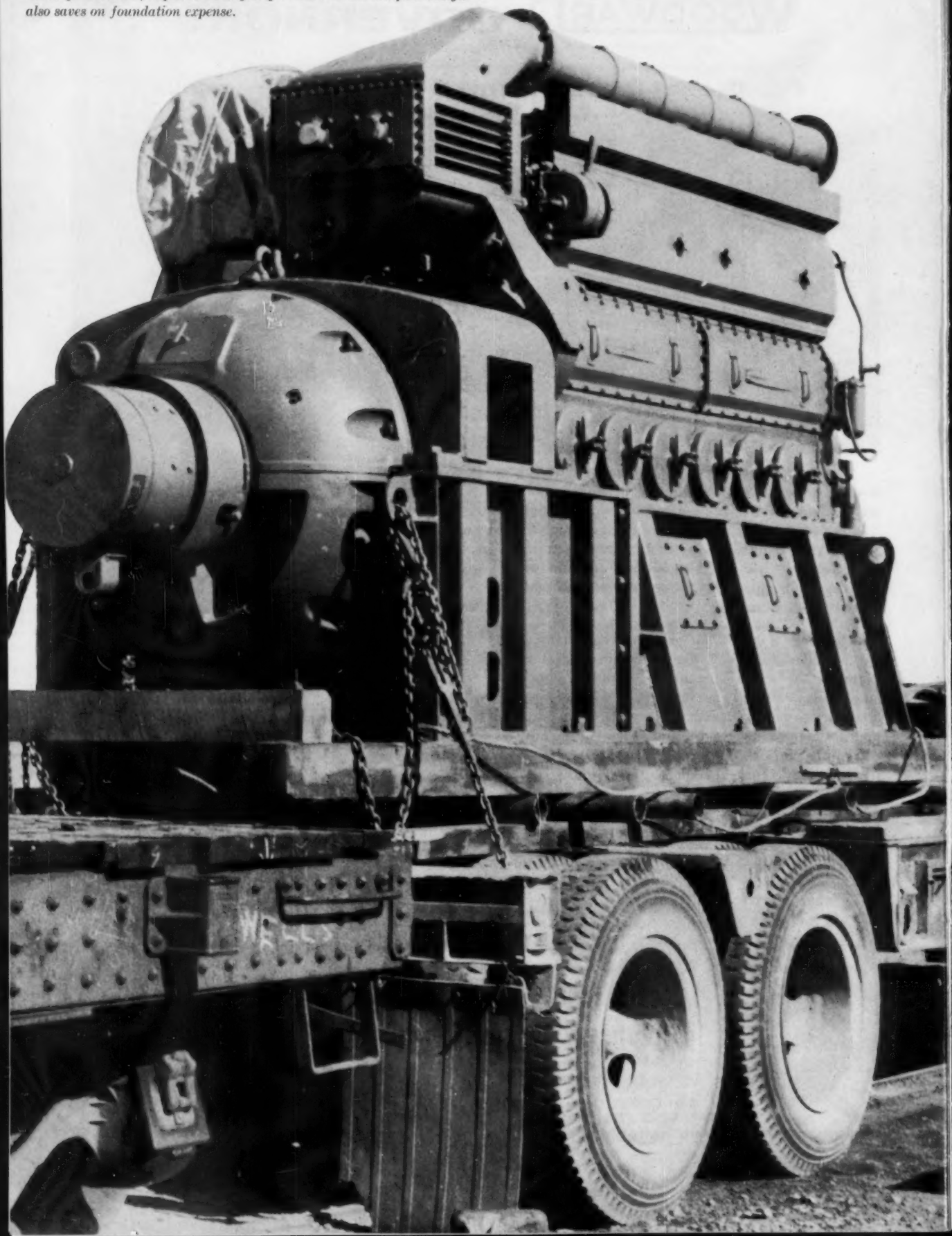
WOODWARD GOVERNOR COMPANY

ROCKFORD, ILLINOIS

Fort Collins, Colorado — Schiphol, The Netherlands

WORLD'S OLDEST AND LARGEST MANUFACTURER OF HYDRAULIC GOVERNORS EXCLUSIVELY

500 KW IN ONE PACKAGE. *This "unitized" engine generator shipped already assembled, requires no aligning at the site. Its compact design also saves on foundation expense.*



1957 POWER!

Long famed for reliability, Worthington 1957 power engines have many new features that can help you produce permanent or standby power at the lowest costs ever achieved for real *heavy-duty* units.

LOWER INSTALLATION COSTS—The new SW 9 engine you see at left has been "unitized" with its generator to drastically cut space requirements, installation time and expense. This design requires no aligning at the site. Should needs ever change, the entire unit can just as easily be picked up and moved to another location.

LOWER FUEL COSTS—In 1957, Worthington is pioneering in power by designing and building engines *specifically* for turbo-charged operation. The SW 14, for example, is America's first high output diesel built only for high pressure turbo-charging.

For economy today *and* tomorrow, all '57 Worthington power engines can be furnished to run on the lowest cost, locally available fuels—residual, crude, and distillate oils; natural, sewage, propane or manufactured gas.

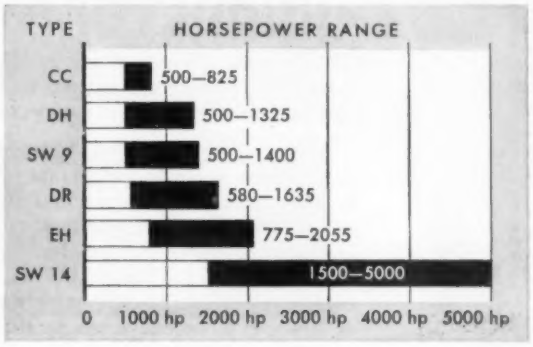
LOWER MAINTENANCE COSTS—With Worthington's 1957 engine line, you enjoy the economy of modern power design plus amazingly low maintenance. One of the many maintenance-saving features of the new SW 9, for example, is the Jet Swirl combustion chamber. The chamber is designed so that the air swirls as it enters the cylinder assuring rapid mixing of air and fuel for extremely clean combustion giving longer valve and liner life, as well as ultra-efficient operation.

The fact that every upper mechanical part is within reach from the operating level is another maintenance saving feature.

For reliable power in the 500 to 5,000 hp range, at the lowest possible cost, get in touch with your nearest Worthington District Office. Worthington Corporation, Harrison, N. J. In Canada: Worthington (Canada) 1955, Ltd., Toronto, Ont.

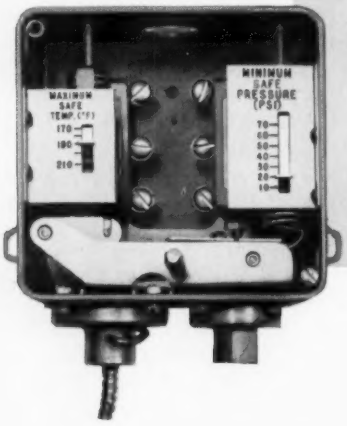
E-7-1

Choose your next diesel from Worthington's complete line of heavy-duty four-cycle power engines.



WORTHINGTON

Temperature and pressure set points are inside the case, protected against accidental manipulation. Cover is removed for easy adjustment.



New Diesel engine safety switch

...gives fail-safe protection

This all-new Honeywell safety switch responds to abnormal pressure or temperature to stop or idle a diesel engine, or actuate an alarm circuit.

It combines separate systems for measuring engine coolant temperature and lubricating oil pressure. The temperature system includes an exclusive fail-safe feature, so that in case of damage to its temperature bulb, capillary or diaphragm, the switch responds as it would to excessive temperature.

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MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pennsylvania—in Canada, Toronto 17, Ontario.

● **REFERENCE DATA: Write for Specification sheet S1010-5 "Diesel Engine Safety Switch."**

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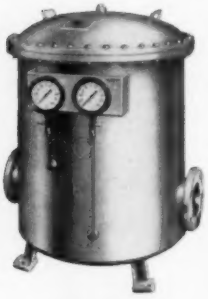

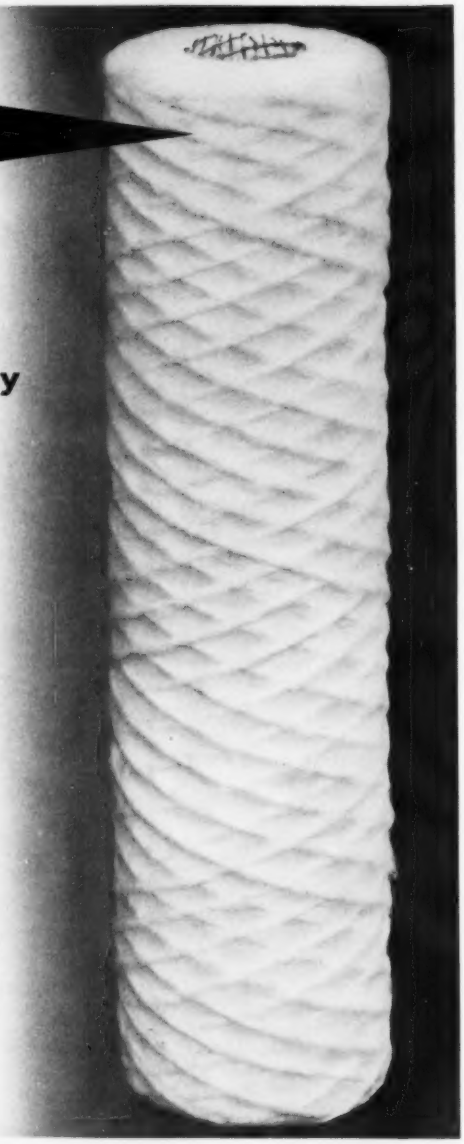

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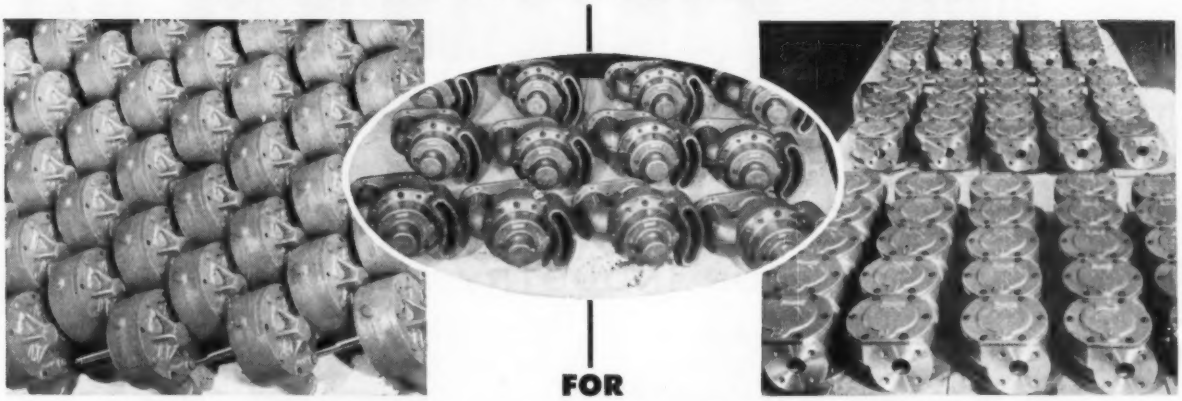

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TUTHILL Bronze Pumps fulfill government specifications for marine service, including shock resistance and other advantages of bronze construction. In addition they offer the rugged durability provided by steel gears.

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They incorporate TUTHILL's well known, rotary positive displacement pumping principle which has proved so effective in the solution of industrial pumping problems.

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If desired, these Bronze Pumps may be furnished with TUTHILL's special *automatic reversing feature*... which permits the pumps to maintain constant direction of flow, delivering from the same port regardless of direction of rotation of the driving shaft.

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TUTHILL policy is based upon "*fitting the pump to the need*" ...rather than "fitting the need to the pump".

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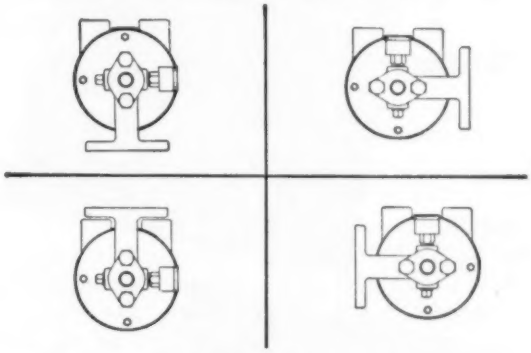

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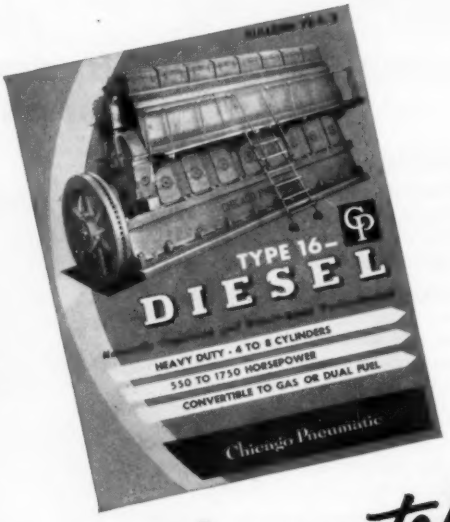

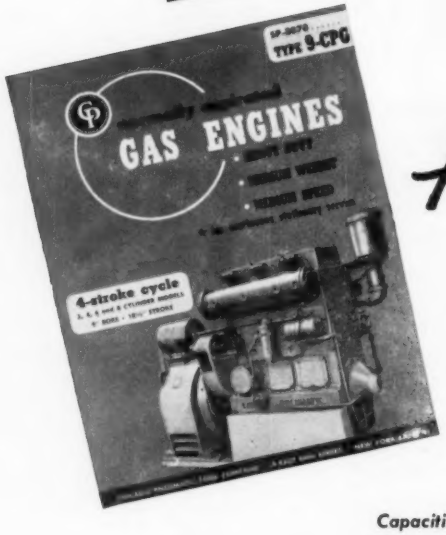

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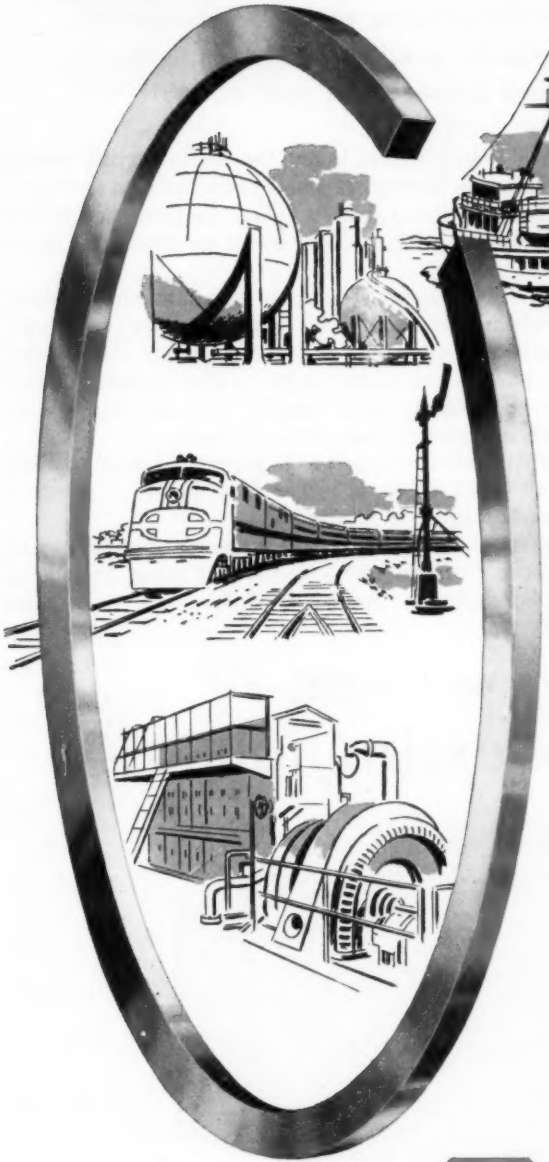

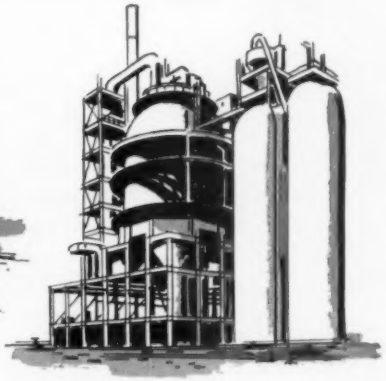

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The Westinghouse electric governor also provides for automatic isochronous load sharing by two or more engine-generator sets. Electric frequency (speed) sensing, another prime feature in the Westinghouse electric governor, eliminates the need for expensive and troublesome mechanical speed-drive systems.

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Let's Talk Merchandising

Somebody goofed on that pitch about building a better mousetrap. Or maybe times have changed. Anyhow, the one about not hiding your light under a bushel (whatever that is) applies pretty well even today. You have to sell your mousetrap. And if you want to sell a lot, you may have to go find more mice. This editorial whimsy is just another way of saying that while our industry builds truly excellent products, there is a growing job in the area of merchandising them. We're talking principally of the large engine field. And we're not talking about the day-to-day sales efforts of the different companies; these are generally excellent. We refer, rather, to the imaginative and high-level job of merchandising the whole industry. There are a lot of key people in different industries—potentially customers—who just don't know what modern diesels can do. Informing them and keeping them informed is not a company job; it's an industry job. Mr. Rankin touched on this in his April article. To show the type of thing we mean, here's a for-instance. Some years back, one company—EMD—cracked the railroads practically single-handed when others said it couldn't be done. They prospered—but they opened a market for other engine builders too. Now they're tackling the utility market. They hired people that knew utility needs and problems, tailored their product, and then brought utility people in from all over to show what they could do. They've sold units, will sell a lot more, *and so will other builders.* If one company can do this, think of the impact of similar industry-wide efforts. Given proper support, DEMA could stage such meetings, each tailored to show modern diesel capabilities in target applications. Member companies could provide program "meat" and see that the right people were invited. We'll bet that accessory men would jump in to help too. Back all this up with a continuing comprehensive public relations and promotion job and there'll be a lot more key people thinking diesel. That's when individual sales effort takes over. Here's the broad sketch of a program that would pay off. Any competent public relations man or association man knows the techniques but it takes more—unity of purpose and 100% backing. How about it? Do we wait for people to find the "better mousetrap" or do we map a path to our door?

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highlights

Petroleum people can all talk the same language if they heed the new dictionary of terms and titles just issued by American Petroleum Institute. Industry everywhere will profit in everyday discussions and dealings if everyone uses the same terms to better define specific functions.

Closed circuit TV, broadcasting from live entertainment on the train, made its debut on British Railways. Initial bow took place on a Glasgow to London excursion. Innovation was such a success, demand was double the passenger space available.

Research into truck brake systems is underway by the ICC and U. S. Bureau of Public Roads. This is of growing concern to highway as well as off-highway units. It takes horsepower up and down hill. Brakes are not enough on the down grade. Hydraulic, compression or electric retarders must be used for safe, controlled braking.

Lack of public approval is the real roadblock to road building. Maj. Gen. Louis W. Prentiss, executive vice president of ARBA hammers away on this point. It matters not how ready and willing are engineers, contractors, suppliers—right down the line. Local opposition to road location must be removed by selling the public on national highway construction.

Application of radiation to petroleum technology is the main reason behind the nuclear research center being built by Socony Mobil Oil near Princeton, N. J. The facility will contain a new 2,000,000 electron volt accelerator, a reactor and a "hot" laboratory for complete integration of the program.

Excavating and earthmoving equipment shipments during the first quarter of 1957 were valued at $228 million. This is an increase of 18% over the last 1956 quarter. Shipments of road construction and maintenance machines totaled $50 million in the first quarter, an increase of 16% over the preceding quarter. Tracklaying tractors shipped increased 16% to $119 million in the first quarter. Contractors off-highway wheel tractors shipped amounted to $28.6 million, up from $19.8 million in the previous quarter. All these increases were reported by the U. S. Department of Commerce.

Growth of the diesel market is pointed up by J. N. Bauman, White Motor president. He expects diesel-powered units will reach 30% of their total truck sales this year. That compares with only 8% in 1954. White now buys all its diesels but a long-range program is under way to develop its own models.

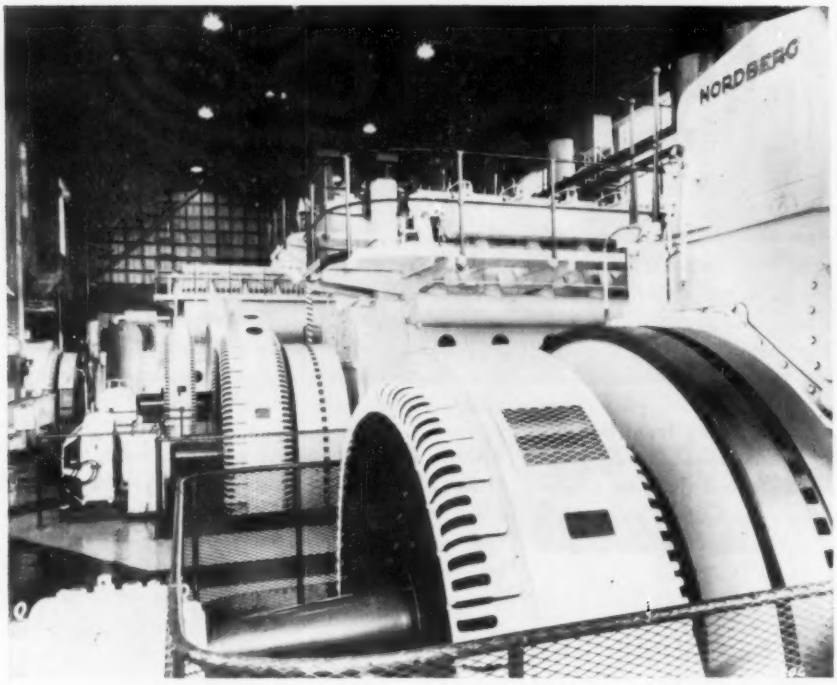
British Railway senior officers were here to study American railroading. They reviewed our latest innovations with an eye to applications in their own railway system. The group—12 in number—was headed by James Ness, chief general manager of British Railways Scottish Region. They exchanged ideas with railroad officials in ten key cities.

World output of crude petroleum quadrupled between 1929 and 1956, while all forms of fuel output only doubled during that period. North America, largest producer of crude petroleum increased output 175% during those years according to United Nations Bulletin of Statistics.

Productivity of up-to-date machinery is one big reason why Cummins hasn't raised engine prices since 1953. Age of their machines averages less than five years. Systematic probing of better ways to do things is another answer to economical production at Cummins.

Big highway news is the Senate Roads Subcommittee agreed to recommend to the parent Committee on Public Works that the 41,000-mile Interstate System be increased by 7000 miles. Total Federal and State cost would be boosted from $27 billion to $44 billion. This figure may even reach $50 billion when new cost estimates are completed. Authorizations of Federal funds would be extended over 20 years instead of 13 years. Construction period would be at least 22 years. This, the ARBA adds, would be a far cry from the original Clay Committee proposal to complete the system in 10 years.

Oil reserves in the U. S. are being depleted four times as fast as the rest of the world. With this and national security in mind, B. Brewster Jennings, Socony Mobile board chairman, warns oil imports must be kept at a reasonable level and our domestic producing industry be made a going concern.



Nordberg 4-cycle, 1630-hp diesel is seen at right. The two large 2-cycle Nordberg engines are at far end of the plant. The far wall is being taken down to permit installation of the plant's largest engine, the 7550-hp unit.

Plant Capacity Boosted 500% in Five Years

Accelerated rate of expansion of Vero Beach Municipal Power Plant not only meets growing demand but anticipates it,—all with no additional taxes on residents.

A 500% capacity increase in five years—that's the achievement of the Vero Beach, Fla. municipal power plant. This rate of expansion is even more remarkable since it was done with no additional burden on the taxpayers. Three Nordberg diesels, totaling 16,100 hp have been installed during this period to raise the total plant capacity to 13,925 kw.

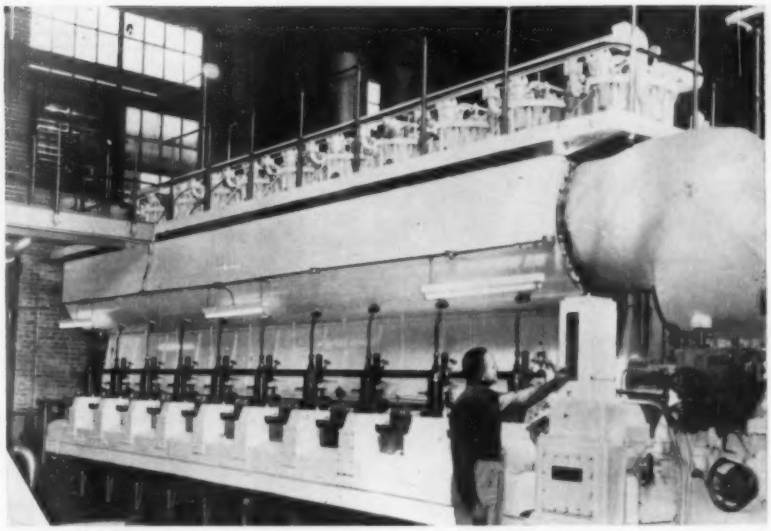
Background

Vero Beach, a little Atlantic coast city 73 miles north of Palm Beach, has grown steadily depending on the vacation trade and on production and processing of agricultural products. It is the county seat and largest city in Indian River County, a famous citrus section. It is the shopping center for this area and an important packing and shipping center for agricultural products.

The city was incorporated in 1919 with a population of about 500. By 1950, there were 4746 permanent residents and the rate of growth began to curve sharply upward. In 1955 there were 7630 residents within the City limits and a total of 10,920 served by the electric system. An additional 3000 are served during the winter tourist season.

The City acquired a 35-kw power plant in 1919 but this soon became inadequate. The original units were replaced in 1920 and '23 by 71-kw and 212-kw sets. These in turn were replaced with a 525-kw air-injection diesel in 1926 and a 753-kw diesel in 1937. The last two units met the city's needs for 10 years and are still in service.

In 1947, Vero Beach bought its first Nordberg engine. This is an 8-cyl, 16-in. x 22-in., 4-cycle, 1630-hp, 327-rpm supercharged diesel driving a 1150-kw generator. In just three years peak loads reached plant capacity and the City had to purchase power to meet the demand. A 4050-hp (2875-kw) Nordberg diesel was ordered, but before it was ready, Nordberg met the emergency by diverting



Superintendent Fred Gosset makes synchronizer adjustment on governor to correct speed of the 4500-hp Nordberg diesel. This has been the base load unit of the plant.

to Vero Beach a 4500-hp engine. This 2-cycle, 10-cyl unit of 21½-in. bore and 31-in. stroke went into operation in 1952 and drives a 3200-kw Elliott generator.

The following year, the originally ordered 9-cyl set was put into service adding 2875-kw to plant capacity. This too was a 2-cycle, 21½-in. x 31-in. diesel turning its Elliott generator at 225 rpm. For the first time in years, the City had the protection of firm capacity.

However, peak loads continued to climb and even the addition of these two engines with combined capacity of 6075-kw would not meet the demand for long. As a result of studies by Harry W. Damerow, a consulting engineer, it was decided to purchase an even more powerful unit. Another 2-cycle Nordberg was selected and installation of this big engine will be completed during the summer of 1957.

Plant Expansion and Production

The new engine is an 8-cyl, 29-in. bore x 40 in. stroke unit rated 7550 hp at 189 rpm. When put on the line it will drive a 5400-kw Elliott generator and will raise total plant capacity to 13,925-kw, more than five times the 2450-kw capacity of just five years ago. It will operate on diesel fuel until natural gas becomes available and then will be converted to a dual-fuel unit.

Conversion at a later date will be simplified since Nordberg incorporated certain dual-fuel components in the oil engine. Major items installed now to simplify future conversion include: dual-fuel type cylinder heads; actuator cams for gas operation; basic fuel pump supports for the gas-actuator pumps; regulating shafts and engine controls for dual-fuel operation; special check valves for the starting air header; high output governor with a synchronous reluctance motor drive; and controls on the engine gauge board for dual-fuel operation.

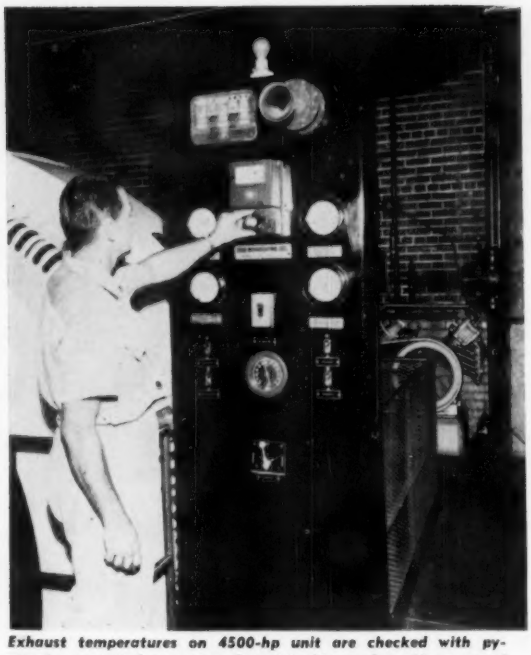
This plant expansion has taken place without placing any burden on the taxpayers of Vero Beach. Not only are all capital expenditures financed by plant revenue bonds, but the electric dept. continues to transfer substantial profits to the City general fund.

In the fiscal year ended June 30, 1956, the electric dept. had gross revenues totaling $707,966 and a net revenue of $322,249. As recently as three years ago, the gross revenue was only $447,282 with a net revenue of $169,928, little more than half the 1956 figure. City Officials figure, conservatively, that net revenue will top $500,000 a year by 1962.

In 1952, kwh production topped 10,000,000, while in fiscal 1956, plant production was up to 22,915,903 kwh. The three Nordberg engines then in service produced 21,759,925 kwh, or 94.9% of the total. The 4500-hp diesel was the base-load engine, producing 10,629,000 kwh. The 4050-hp unit generated 8,500,650 kwh and the smaller 1630-hp engine, another 2,630,275 kwh. The engine now being installed will take over base-load service, but load expansion continues to be so rapid that the other Nordberg engines are expected to be operated at continued high-production rates.

The City has tried to even out the load as much as possible and has succeeded in filling in summer valleys to some extent with air conditioning load. But the winter peaks grow as fast or faster. Most residents feel the climate is too mild to justify central heating equipment, but electric space heaters are becoming increasingly popular. When the mercury dips and these heaters come on, load on the plant zooms up as much as 2000 kw.

In addition to being the production leader of the plant in the last fascal year, the 4500-hp engine was also the efficiency leader with an average of 13.54-kwh per gal of fuel at an average load of 63%. Average for the entire plant was 13.1 kwh per gal. Lube oil consumption for the 10-cyl engine was 6835-hp hr per gal. The other



Exhaust temperatures on 4500-hp unit are checked with pyrometer mounted on gauge board beside engine. Alarm panel and other gauges can also be seen mounted on the board.

Nordberg Engine	Engine Hours	Kwh Generated	% Plant Total	Gal Fuel Consumed	Kwh/Gal Fuel	Gal Lube	Hp Hr/Gal Lube
4500 hp	5234	10,629,000	46.3	784,699	13.5	3446	6835
4050 hp	4638	8,500,650	37.1	674,413	12.6	3207	5857
1630 hp	3615	2,630,275	11.5	197,196	13.3	1040	5665
Total Nordberg	13,487	21,759,925	94.9	1,656,308	13.1	7693	6250
Total Plant		22,915,903		1,748,384	13.1	9437	

Nordberg engines also showed good lube oil economy with 5857- and 5665- hp hr gal. respectively.

Pressure for economy is great in this plant since it uses a relatively expensive fuel, a distillate oil costing 11.65 cents per gal. Installation of two 25,000 gal tanks in 1956 more than doubled fuel storage capacity. All fuel is passed through a 17-element cellulose filter which removes particles down to two microns. An additive is put into each truckload of fuel before unloading and is credited with helping to keep injectors clean. Injectors are in service a full year without change on the 4500-hp engine.

Maintenance Program

In a plant where peak load has so often been above firm capacity, it's essential to keep engines in peak operating condition. A good preventive maintenance program is strictly followed. Superintendent Gossett and his men do all their own maintenance and keep complete records. There is one operator and an oiler on each shift, the oiler actually being an apprentice operator.

There is a separate card for each piston, bearing, cylinder liner or other major wearing part. It lists the make of the part, measurements, work done, time spent, personnel making repairs, and condition of the part. To increase personal interest in the work, each operator has the primary responsibility for one engine. The appearance and performance of the plant show that this policy pays off.

Scheduled inspections show that pistons are clean after as much as 10,000 hours and that liner and bearing wear are very low. Mr. Gossett believes that careful attention to lubrication helps to achieve this. A detergent-type oil is used in the cylinders and a straight mineral oil in the crankcases of the 2-cycle diesels. Further additives are put in at the plant. Each 2-cycle engine is served by a 20-element activated-clay filter to remove impurities and acids from the oil. In addition, the plant uses a batch reclaimer to correct dilution.

To insure a good film of oil on liners before a load is put on, oil from a motor-driven lube pump is circulated through the engine while turning it with the barring motor for about five minutes before starting.

Conclusion

Vero Beach has come through a period of rapid growth with a very efficient, heavy-duty power system. There is every reason to believe that the City will continue its accelerated growth and that its power plant will continue to build up with quality equipment.

Major Equipment List

Engines—7550 hp-4500 hp	
4050 hp-1630 hp	Nordberg Mfg. Co.
Generators	Elliott Company
Governors	Woodward Governor Company
Blowers	Elliott Company
Fuel Oil	Sinclair Oil Company
Fuel filters	Briggs Filtration Company
	Wm. W. Nugent & Co., Inc.
Fuel meters	Neptune Meter Company
Fuel injection pumps	American Bosch Corporation
Fuel additive	Lubaid Company
Lube oil	Texas Company
Lube additives	Bardahl Oil Company
	Miracle Powder Distributing Co.
Lube filters	Honan-Crane Corporation
Lube reclaimer	Hilliard Corporation
Lube strainers	Nordberg Manfacturing Co.
Lube pumps	DeLaval Steam Turbine Co.
Cylinder lubricators	Manzel Div., Frontier Industries, Inc.
Piston rings	Double Seal Ring Company
	C. Lee Cook Company
Cooling water pumps	Pennsylvania Pump Company
Air Filters	American Air Filter Company
Exhaust silencers	Maxim Silencer Company
Gauge panels	Nordberg Manufacturing Co.
Gauges	J. E. Lonergan Company
Alarms	Viking Instruments Inc.
Switchboard	Allis-Chalmers Mfg. Co.
Exhaust pyrometers	Alnor, Ill. Testing Labs., Inc.

One of the five dump-trucks powered with Model 6DAS-844 Buda diesels in which Detergent-Action fuel was field tested for over 3000 hours during an eight month period. This truck, owned by the Bagdad Copper Corp. is seen ascending a test grade.

Treated Fuel Betters Engine Performance

Laboratory and field tests of refinery-treated fuel show effectiveness in keeping injection systems clean longer, raising engine output and lowering fuel consumption.

TREATED fuels can be very effective in cutting cost of injection equipment maintenance. In addition, by keeping the injection system, and particularly nozzles, clean longer, clear exhaust, high engine output and lower fuel consumption result.

Refinery-treated fuels have been available for some time, these generally selling at premium prices. They prevent rust, and gums or lacquer from forming on injector plungers, check valves and orifices. In some cases, engine operators themselves are using additives to give conventional diesel fuel desirable detergent and anti-rust qualities. Here, however, the correct additive must be chosen and used in the right proportion.

It is becoming more apparent, especially in exacting services, that fuel treatment is both beneficial performance-wise and economical. Just as in gasolines, there is a trend toward fuel treatment. There is a good case for use of such fuels providing its cost isn't excessive in view of the benefits gained.

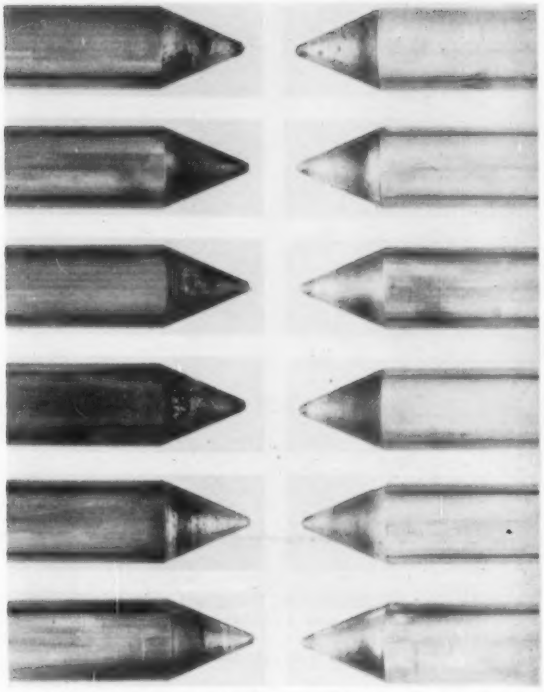
One example of the refinery-treated fuels available, and in this case one which is not premium-priced, is that developed and recently introduced by the Standard Oil Co. of California in its marketing area.

Although it will not remove previously formed deposits, tests tend to show that this Detergent-Action diesel fuel will keep injection systems clean indefinitely. Its action on injector parts is similar to that of detergent-action gasoline (used for years) in carburetors. Injection systems parts are continually washed with a fuel capable of dispersing any deposits that may form.

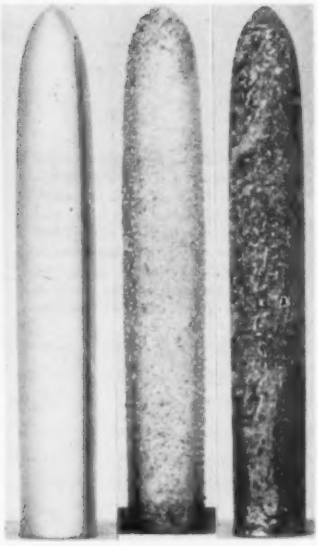
This oil has been placed on the market after successful testing in laboratory engines and several truck fleets. Some results of both the lab and field tests made by Cal Research (research subsidiary of Std. Oil Co. of Cal.) follow.

Laboratory and Field Tests

Field tests in tank trucks equipped with the Cummins NHB-600 engines showed the benefit of keeping injectors clean. In these tests, Detergent-Action diesel fuel kept injectors in essentially new condition throughout the normal overhaul life of the injector. This cut injector maintenance costs and reduced exhaust smoke.



Set of six Cummins injector plungers at left are shown after 100 hour test at high load using non-detergent diesel fuel. Set at right is seen after similar 100 hour test at high load but using Detergent-Action diesel fuel. Note how much cleaner they are.



At left is shown how Detergent-Action Chevron diesel fuel protects against rust. At center and at right are pitted metals resulting from use of competitive fuels.

A comparison of exhaust smoking on three trucks which used Detergent-Action fuel and on four which used non-detergent fuel was made. Even after 60,000 to 70,000 miles, the smoke from trucks which had been using Detergent-Action fuel was no greater than smoking with new injectors. Trucks on conventional fuel, however, gave nearly twice as much smoke after this same period of operation. In smog conscious areas, the importance of having clear exhaust stacks is self-evident.

To determine whether Detergent-Action diesel fuel would help the problem of deposits accumulating in GM "71" injectors subject to long periods of idling and low-load operation, 100-hr idling tests were run in Cal Research lab's GM engines. The best indication of build-up of injector tip deposits is exhaust smoking. When using the detergent fuel, exhaust smoking did not increase significantly above clean engine conditions at any time during the test. With conventional fuel, however, exhaust smoke cycled up and down due to deposits building up and breaking off at the injector tip. These tests showed that where GM "71's" are used in this type of service, Detergent-Action fuel offers a real advantage.

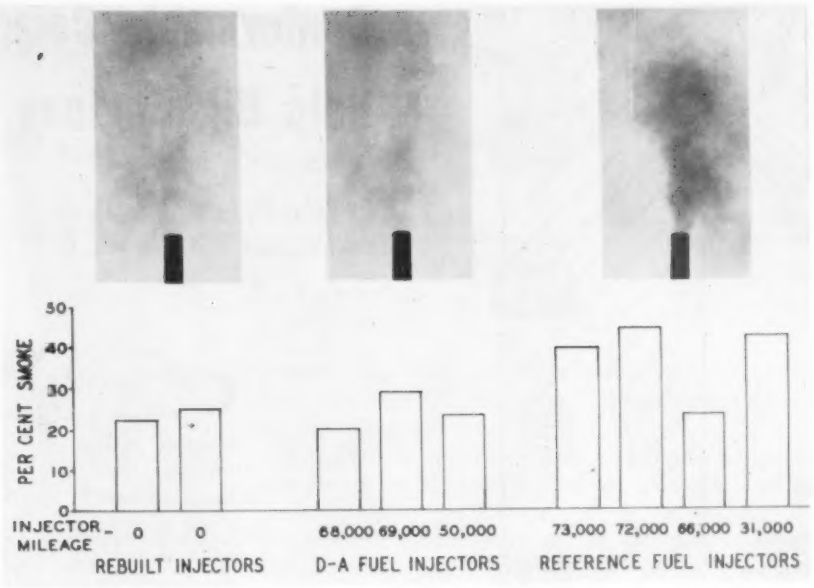
The new fuel was also field tested for eight months in Buda-powered dump trucks. The engines were equipped with American Bosch injection systems. Each of five Buda 6DAS-844 diesels ran on Detergent-Action fuel for more than 3000 hours. For comparison, five identical engines were run on conventional non-detergent fuel. To detect differences in performance between the injectors which had operated on detergent fuel and those on non-detergent fuel, it was necessary to test the injectors on a dynamometer-mounted engine where load and speed could be precisely controlled. The dynamometer tests showed a small but significant advantage for Detergent-Action fuel after 3000 hours' operation in terms of exhaust smoking and fuel consumption. Average fuel consumption was 2 lb per hr less and average exhaust smoke 4% less.

Rust Protection

In addition to its detergent properties, the new fuel has improved rust prevention characteristics. Most diesel fuels have better natural rust inhibition than gasolines. However, diesel fuels from certain crude oils or fuels that have been highly refined generally afford little or no rust protection. Chevron diesel fuels produced from California crude oils have good natural rust inhibition, and addition of Detergent-Action properties makes them better.

Automotive-type diesel fuels have a much greater rust tendency than most regular grade fuels because they are lower boiling and more highly refined. The new Detergent-Action automotive diesel fuels have improved rust prevention properties.

Although rusting does not occur very frequently in diesel engines, if it does occur in the injection system it causes serious problems. The badly rusted injector plungers shown, were removed from engines in fishing boats. The fuel became contaminated with a small quantity of sea water and because the fuel had poor anti-rust properties, severe rusting took place. The resulting injector failures would have been prevented had Detergent-Action fuel been used. This fuel also reduces rusting in storage tanks and lines.



Comparison of exhaust smoking on three trucks which used Detergent-Action fuel (center) and four trucks which used non-detergent fuel (right). Note how trucks using non-detergent fuel smoke nearly twice as much as those using Detergent-Action fuel after same period of operation. After 60,000 to 70,000 miles, engines using D-A fuel smoked no more than those with new injectors (left).

Effects Of Treated Fuel On Other Parts

During engine tests on the new fuel, data was also obtained on its effects on engine wear and deposits. These tests showed that Detergent-Action fuel has no harmful effects on engine parts. In some engines it even reduces piston deposits. In GM "71" engines, for example, it consistently reduced deposits which formed in the upper grooves of the piston. Of course, keeping these deposits at a minimum avoids ring sticking and breakage, and possibly piston seizure.

Results of 300-hr high load tests in Cal Research's GM 3-71 engine showed that when using nondetergent fuel, 82% of the volume behind the top ring, and 83% of the volume behind the second ring were filled with deposits. With Detergent-Action fuel, only 30% of the volume behind the top ring and 53% of the volume behind the second ring were filled with deposits.

As far as wear on valves, piston rings, cylinders and bearings are concerned, there is no difference between the new Detergent-Action fuel and conventional fuels.

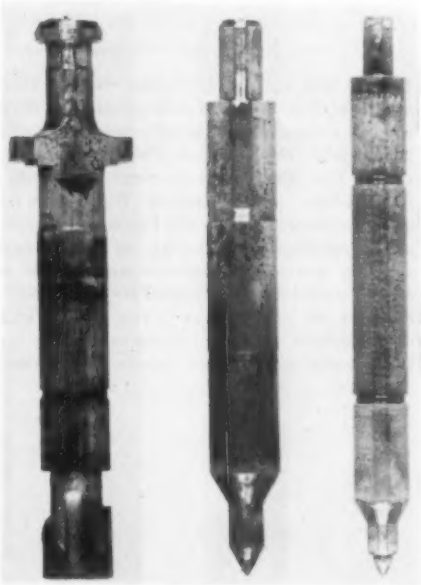
Because of its dispersing properties, the treated fuel will improve fuel system filter performance. The new fuel has the same storage characteristics as conventional fuels. However, it has shown no tendency to increase gum formation in storage nor did it cause increased emulsion problems.

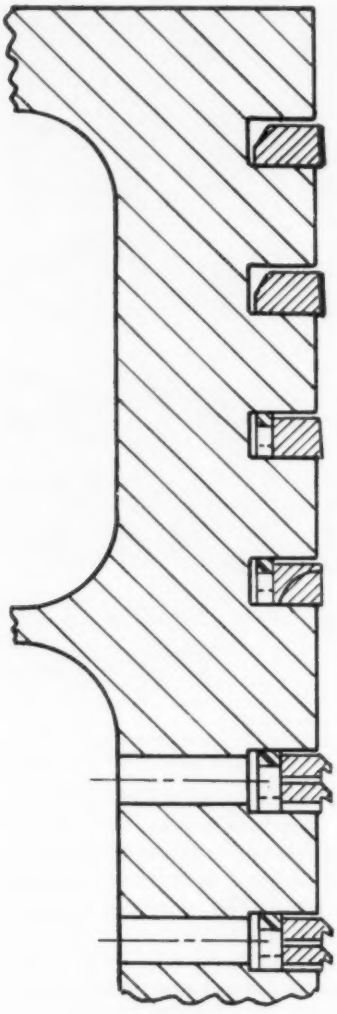
One might expect a fuel having dispersant properties would pick up rust and scale from storage tanks and lines, carry these contaminants in suspension, and deposit them on filters. To check on this possibility, all of the fuel used in the field trial was passed through micronic paper filters. Over 500,000 gallons of fuel passed through these filters with no evidence of filter plugging. At the completion of the field trial the filters were inspected and no gums or foreign contaminants of any kind were found on the filter elements.

Conclusion

Treatment of diesel fuel with detergent and anti-rust additives indicate many beneficial results. Tests by Cal Research on the new fuel has shown this to be so. Facts indicate that there will be more such fuels available which are not premium-priced. This of course is an encouraging outlook for the users.

Badly rusted parts from injection systems on diesels used in fishing boats. Fuel had sea water in it. Detergent-Action fuel would have prevented this.





Typical ring set for large-bore 4-cycle engine improves sealing. Full power is maintained longer and lube oil contamination is reduced. Both conformable compression rings and conformable oil rings are shown. Two top compression rings are chrome plated for maximum wear resistance. Taper Face conformable compression ring in third groove is provided with peripheral-abutment spring to supplement gas pressure. Sealcut conformable compression ring in fourth groove also has peripheral-abutment spring. Formflex oil control rings in two grooves at bottom of piston have peripheral-abutment springs to assure that excess oil will not remain on cylinder wall.

Conformable Compression Rings Help Big Engines Too

By John O. Lutz

Chief Engineer, Wilkening Mfg. Co.

CONFORMABLE compression rings are now being successfully used in large industrial engines. Their outstanding performance in small and medium size units certainly justified application of these ring designs in large engines. By maintaining a more effective seal, high power output is preserved, lube oil contamination is avoided, and build-up of crankcase pressure is prevented by these rings. To see how this is done, let's discuss the design with which I am most familiar, the conformable ring with a peripheral-abutment spring made by Wilkening Mfg. Co.

Ring Construction

Conformability is obtained in two ways: First, the cast iron ring is radially thinner. This makes it easier for the gas pressure to bend it outward to conform to non-circular cylinder walls. In addition, the ring has a spring (equalizer) which positively forces it against the cylinder wall under all conditions of cylinder pressure. Combined radial thickness of the ring and equalizer is the same as a single-piece ring. This overcomes any possibility of installational difficulty.

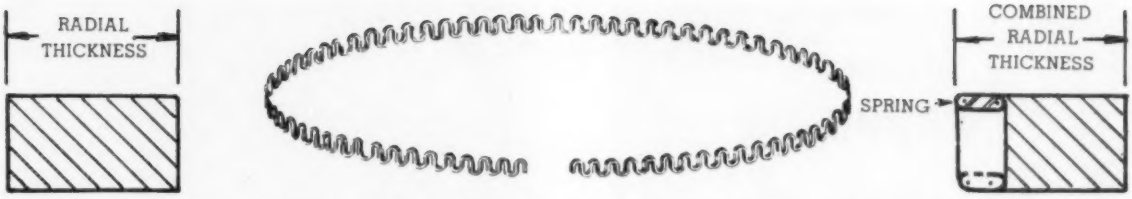
A peripheral abutment spring is used in preference to a hump-type expander. This exerts a uniform pressure around the entire ring periphery resulting in maximum conformability. They are most efficient in lower compression grooves where use of a spring behind the ring supplements the gas pressure and inherent ring tension.

Ring Operation

The top ring gets the greatest assist from cylinder pressures in being forced against the cylinder walls. Gas pressure behind and on top of the second ring is only what leaks through the top-ring gap. Pressure on the third ring is even less. By the time gas pressure reaches the lowest compression ring there's hardly enough to keep the ring from leaking. Yet, the lowest compression ring is the last line of defense—if gases get by it they go into the crankcase.

Leakage and application of gas pressure against the compression rings to get a satisfactory seal must take place in a fraction of a second. Pressure available for sealing purposes at each ring location is less the lower the ring position on the piston.

A fairly acceptable rule of thumb is that the pressure at each ring diminishes by one-half at each succeeding lower



Thickness of conventional compression ring at left is equal to combined radial thickness of conformable ring plus peripheral-abutment spring. Peripheral-abutment spring in center forces the thinner conformable ring outward and helps gas pressure to bend ring to conform to cylinder walls.

ring location. Many variables such as engine speed, ring and cylinder wear, gap clearance, and groove wear which affects side clearances, influence pressure drop. However, this rule of thumb is a fairly acceptable indication of pressure conditions at each ring location.

Actually, the average cylinder pressure (mean effective pressure) is considerably less than the maximum pressures, and the average pressures at each ring location are substantially lower.

Need For Conformable Rings

If cylinders were actually round there would be no need for comformable piston rings, either compression or oil control. It is practically impossible to machine an absolutely round hole in a cast iron liner. Even if it was possible, machining would be done at room temperatures and these are much lower than during engine operation.

Even the most accurately machined bores are subjected to structural distortion when assembled. Further distortions result from internal forces and temperature gradients during engine operation. Add to this, two variable quantities of cylinder wear, one caused by piston forces on the major and minor thrust faces producing out-of-roundness; the other caused by heat and pressure at the top ring producing cylinder taper. Under these adverse conditions piston rings must follow the cylinder wall irregularities at all times in order to effectively seal the combustion chamber.

Distortion and wear are often so great that it is almost impossible for all rings to conform to the cylinder wall under all conditions of operation. If compression rings don't contact the cylinder wall there is a substantial power loss and an increase in fuel consumption. An increase in wear of both rings and cylinder due to breakdown of the lube oil film and an increase in blowby also results.

The inability of compression rings to form a satisfactory seal against the cylinder wall is accentuated in normally aspirated 4-cycle engines. In these engines there is a partial vacuum in the cylinder during one whole stroke. During this period only ring tension is available to force the ring against the cylinder wall. As this tension is insufficient to overcome the wear and distortion irregularities of the cylinder wall, the seal will be broken.

Lubricant on the cylinder wall will pass into the combustion chamber on the intake stroke instead of being scraped down. This contributes to high oil consumption and excessive carbon formation on the piston and around the upper ring-belt area.

Also, rings leaving the cylinder wall even momentarily may disturb the lubricant film increasing the risk of metal-to-metal contact.

Below atmospheric pressures do not exist in supercharged 4-cycle and 2-cycle engines. However, in many of these installations the pressure on the intake stroke is so low that it may be insufficient to assure ring contact with the cylinder wall at all times. This is especially true at the lower compression ring locations where actuating pressure is dependent upon leakage past the rings above.

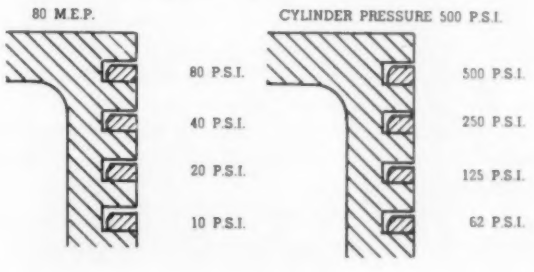
It is also true that during the greater portion of all piston strokes there is insufficient pressure to assure a positive cylinder wall contact by the lower compression rings at all times.

Conformable compression rings are readily adaptable for 4-cycle engine application. However, for 2-cycle engines the problem is complicated by the porting arrangement in the cylinder walls. Where it is possible to use these conformable ring designs in 2-cycle engines, each must be specifically designed for the intended application.

Conclusion

The outstanding performance of comformable oil control rings is well recognized throughout the internal combustion engine field. It is anticipated on the basis of improved engine performance that conformable compression rings will become as popular as conformable oil rings in large industrial engines.

Average pressure available for sealing purposes at each ring location is seen at left. Maximum pressure available for sealing purposes at each ring location on piston is given at right.



Repairing Block-to-Liner Seal Areas

New technique saves time and cost in repairing corroded lower cylinder liner support and seal areas in engine blocks. In-place repairs are made with special tool and threaded inserts. Successful in marine service, it will work ashore too.

First step is to check squareness of upper liner support with axis of bore. Roundness is also checked. Tool indicates warpage and if any is found, corrects it by machining. This provides an accurate seat for the special boring bar used for subsequent machining and thread-cutting of the lands.

WHEN cylinder liners wear or corrode on the water side, you can replace them. But what do you do when the lower liner support and sealing areas in the engine block start to go? Water leakage from the jackets at these points is a real problem.

Failure of the water-seal lands is principally due to corrosion. Adjacent surfaces of the cast iron cylinder liner and the supporting and sealing lands in the block become pitted and scaled. Seal ring grooves become irregular and can no longer hold the seal rings squarely or with the proper pressure.

Conventional repair technique for this job has usually been to grind corrosion products from the sealing area and build up the shoulders with welding. The weld bead is then ground down (or in some cases machined) to the desired dimensions.

Welding, however, generally necessitates removal of the engine to a shop. It is a job requiring an experienced welder and a good machinist. Setups equal to the number of cylinders may be required on a large boring mill. At that, thermal stresses set up by the welding operation have to be tolerated because stress relieving of big blocks is often impractical.

A new repair technique for this job has recently been developed. It is relatively simple, fast and produces a permanent repair. It is a cold-repair process, success of which is dependent on a specially-designed boring and threading tool and use of ring inserts of ductile Ni-Resist cast iron (an International Nickel Co. proprietary alloy).

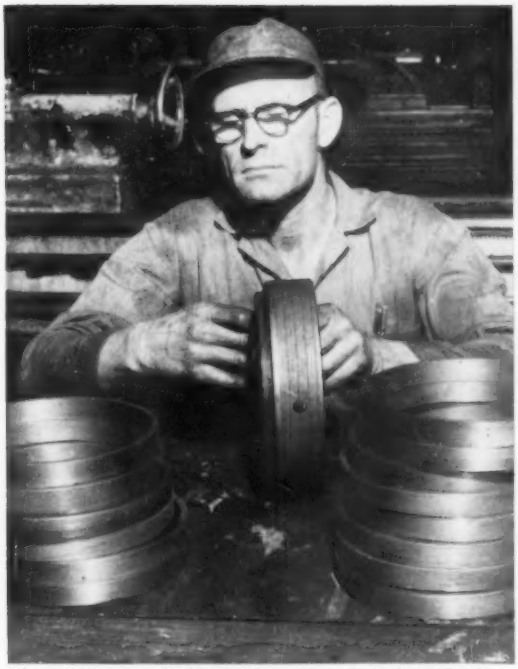
Whaley Engineering Company of San Diego, California, developed the technique and has used it successfully on 38 marine diesels. Repair time was cut from approximately three weeks to four days per engine.

Although the pictures shown were taken in the shop, Whaley is able to repair the diesels in place. Repair equipment is completely portable and Whaley's personnel have made repairs as far from their home base as Ponce, Puerto Rico.

While saving time and money, Whaley reports reduction in subsequent corrosive action when the engine is returned to service. The special ring material not only provides the ductility needed for deformation during installation but also has excellent corrosion-resistant properties.

Mr. Whaley expects much longer life than that of the original sealing areas. Some repaired blocks have been in service for nearly four years and have showed no signs of corrosion or pitting when inspected during regular overhaul periods.

Support and sealing lands are machined to proper oversize and taper-threaded to accept the ductile Ni-Resist inserts. Here, one fits above and one below the water inlet. Rings build shoulders back to original dimensions. Threading head (in Mr. Whaley's hand) is ready to attach to bar's shaft.



Insert rings are checked in ring gauge. Centrifugal Casting Co., Long Beach, Calif., makes castings from 8-in. to 18-in. OD, 1-in. or thicker, and 13-in. long. Whaley machines rings. Type 2 ductile Ni-Resist combines strength and toughness of ductile iron and corrosion-resistance of usual Type 2 Ni-Resist.

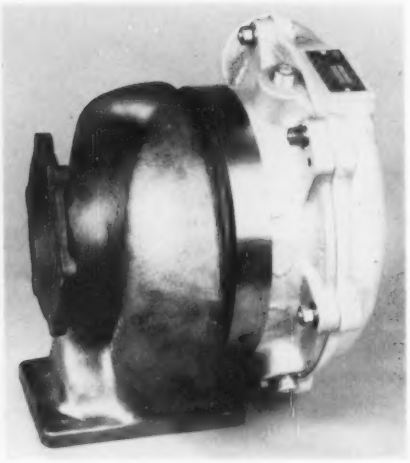
Rings must be deformed to get through smaller openings at top of block. Ring is being attached to wrench (normally done in block). Four nuts pull cover plates together and ring is reformed to perfect circle. Use of ductile Ni-Resist permits deforming and reforming of ring without danger of cracking.

Heavy wrench is used to screw the taper-threaded lower ring into position. In this engine, second ring (above water inlet) is installed the same way. Block is then ready for final machining. Boring bar mounts over each hole in turn to machine lands plus any seal ring grooves to proper size.

New Turbochargers Go Into Production

By Ben Barish

Mgr. Power System Development, Thompson Products, Inc.



Model 22-650 turbocharger showing configuration of the two exhaust gas plenum chambers and flanged turbine outlets.

Constructional details of a new turbocharger line developed by Thompson Products for engines up to 400 horsepower. Design objectives and how they were met are also discussed.

THERE'S a difference in the turbocharging requirements of diesels of, say, up to 400 hp and those for the larger engines. Since this line of turbochargers was developed for the smaller engines, let's take a look at these requirements since they dictate the design objectives. These will include:

(1) Efficiency—Here, efficiency must be considered in terms of the broad range of work cycles and conditions anticipated. You can't design for one set of optimum conditions; the smaller engines commonly operate in a constantly changing and wide range of speed and load conditions as well as at varying altitudes. So efficiency must hold up over a broad operating range.

(2) Ruggedness—The overall design must be rugged enough to stand the hard knocks of road vehicle and construction machinery operation. Internally, it must stand up to the range of thermal, mechanical and fatigue stresses encountered under the operational conditions mentioned.

(3) Simplicity—There's a two-pronged incentive for getting maximum simplicity. First, there is the influence on production costs. By holding turbocharger costs down, the turbo-engine package becomes more attractive pricewise in view of the greatly increased power output and improved efficiency. Secondly, simplicity is a big factor in ease of maintenance.

(4) Adaptability—Ease of installation on a given engine and flexibility to permit adaption to a broad range of engines is very important, particularly for a production-type unit. Two factors are envolved: The physical part of installation and thermo-aerodynamic matching of the unit to the engine.

Now let's discuss these (in reverse order) to see how these design objectives were met.

Adaptability

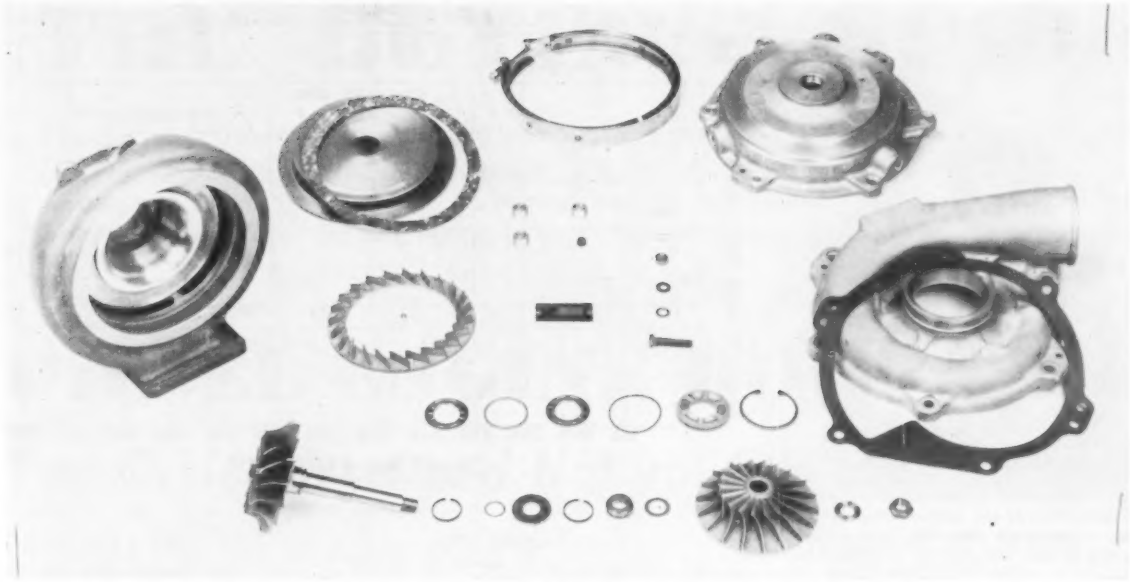
Because of the compactness of design, these turbochargers can be installed on an engine with a minimum of change from the present installation. The table below indicates overall dimensions of our various models, including approximate indication of the engine sizes for which these turbochargers are applicable.

Turbocharger Model No.	22-200	22-650	22-1050
Overall Length	6.00	8.87	11.85
Largest Diameter	6.25	10.75	11.50
Naturally-Aspirated Engine Power	50-120	120-200	180-300

Because of light weight and rugged parts, these units can be mounted on the engine exhaust manifold without auxiliary supports. Turbine inlet and compressor connections can be rotated to any position with respect to each other because of the V-clamp assembly of the main blower parts. The bearing housing is designed to permit proper oil scavenging regardless of the angular location of this piece. Compressor inlet and outlet ducts are designed for simple housing clamp attachment of induction piping. Turbine inlet and outlet ducts are flanged to allow use of through-bolts in both locations.

For installational simplicity, we have designed an air-cooling unit. Rather than use of engine oil to prevent the bearings from getting overheated, careful attention to design has prevented heat from getting to the bearing area. This was done by making heat flow paths to the bearing housing as small in area as possible.

In addition, we use aluminum in the bearing housing. Heat conductivity properties of aluminum have eliminated hot spots and provide rapid cooling of the bearing housing by the surrounding air. To further avoid problems

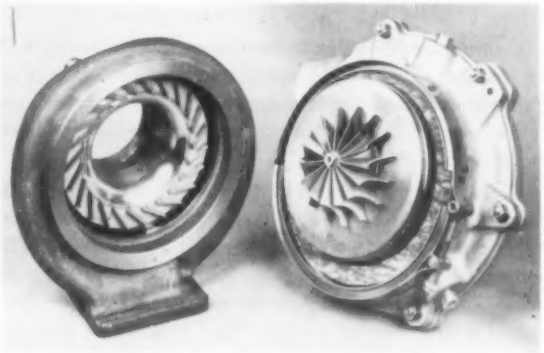


Clockwise from turbine housing are; turbine spacer and inner shroud with gasket; V-clamp; bearing housing; and compressor scroll. Under spacer is nozzle ring with "hardwear" at right. Row below is thrust bearing components. Bottom row shows the turbo rotor components.

associated with the high temperature in the turbine area, we have eliminated use of bolts or studs in the high-temperature sections of this blower.

The bearing housing is further protected from heat from the turbine side by use of an air bleed. A drilled hole passes air from the compressor scroll to the back of the turbine wheel. Cumulative effect of all the cooling provisions is that the turbocharger can be shut down while operating at full load without ill effects from the transient high-temperature conditions that would normally exist.

Regarding matching to different engines, the three unit sizes, each with a selection of nozzle rings, provide for a broad range of application. This applies to different engines or to a given engine in different operating environments.



Nozzle ring recessed in turbine housing is clamped in place by spacer-inner shroud (right) when held together by V-clamp.

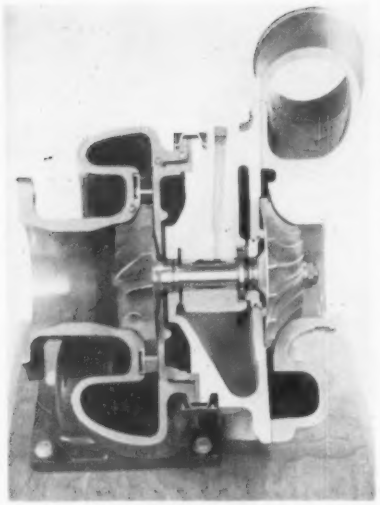
Simplicity

A brief constructional description will show the unit's simplicity. It can also be seen in the illustrations. Note that the design is such that the principal machining operation of stationary components is turning. Absence of studs and cap screws, while justified designwise alone, helps in the matter of costs and in ease of servicing.

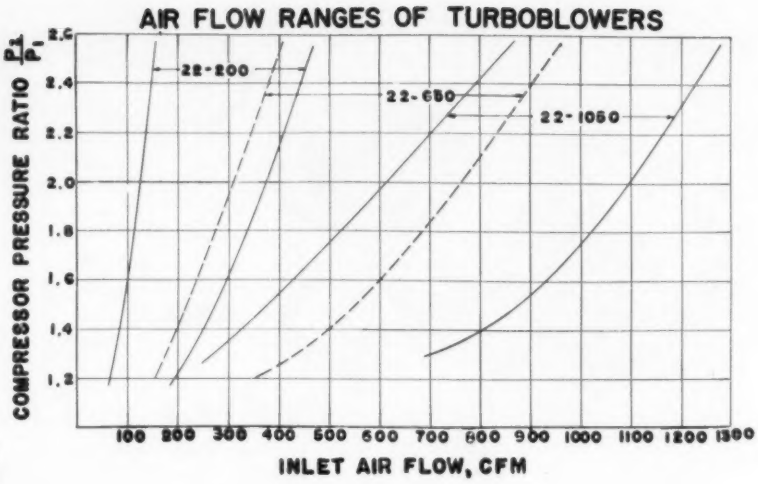
Modern supercharged diesels are generally designed with large valve overlaps to allow complete scavenging. Because of this overlap, the turbine housing inlet must be split. This permits separate banks of cylinders to exhaust independently and thus avoid interference between cylinders that are exhausting at nearly the same time.

The housing's dividing web is a short one. The two gas flows each enter a separate plenum chamber. These two chambers wrap around the periphery of the turbine in

Compressor end of Model 22-650 unit. Hole to left of impeller is air bleed hole for turbine cooling.



Shape of Mod 22-650 turbine outlet duct designed as preliminary transition piece of exhaust piping to give low pressure at turbine outlet.



opposite directions for 180 deg each. This type of housing was selected instead of a double scroll. The efficiency is just as high and we eliminate the problems associated with a long dividing web buried in the hot gas stream.

Compressor design includes an impeller combined with an annular diffuser and scroll combination. Because of the light weight of the impeller, we can get high pressure ratios without resorting to complex or high-speed bearing designs.

A carefully thought out development program on bearings and seals produced very simple elements yet ones that have proved fully equal to the severest tests imposed. The rotor bearing is a special bronze bushing. Rubbing speeds, not radial loads, are the main problem. This fact permitted a wide central annular relief area which gave the effect of two bearing areas, well separated for rotor shaft stability.

Elements of the simple interrupted-surface thrust bearing can be seen in the picture of component parts. Seals are simple O-rings of selected materials. Only two gaskets are used and these are made of commonly available materials.

The turbine is made from a heat-resistant alloy. It has been designed to withstand inlet temperatures of 1500°F or over. The life of this turbine will include 10,000 hours under the most severe temperature conditions at the highest operating speeds.

Nozzle rings are currently fabricated of one of the stainless steel materials. They fit in an annular recess turned in the turbine housing. A dowel holds the ring against turning and it is clamped in place by the spacer that forms the inner turbine shroud.

The whole works is held together (with the exception of the bolted compressor scroll) by the clamping action of the V-clamp.

Ruggedness

Much has already been said to show the general ruggedness of the component parts. From the external point of view the major support unit is the turbine housing. This is cast of a ductile Ni-Resist material. Overhung weight is reduced by use of aluminum and the compact design shortens up the moments.

Earlier comments regarding cooling detail the steps taken to reduce thermal loading as much as possible. This also means that fatigue strength will be higher with cooler parts.

Mechanical ruggedness has also been shown. An example of the adequacy of the bearing and lubricating system is evidenced by the fact that dynamic balancing of the shield assembly is not needed. Static balancing is all that is used. The additional radial bearing loads imposed by any minor unbalance are well within the design limitations of the system.

Efficiency

Since performance is of extreme importance in any turbocharger design, we have paid particular attention to aerodynamic considerations. The compressor design involves an impeller whose aerodynamic shape and internal velocities result in good efficiencies. Although this design is simple to manufacture and maintain, it has the highest efficiencies over a very broad range of operations.

The light weight of our impeller and turbine results in a very low inertia. Thus the unit will have immediate response to speed and load changes on the diesel engine.

The accompanying illustrations show how we have achieved a combination of aircraft performance with automotive simplicity and ruggedness. Here is a unit as tough as the diesel it's mounted on, yet efficient enough to give tremendous increases in power with the bonus of reduced fuel consumption.

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AMERICAN M-A-N CORPORATION
149 Broadway
New York 6, New York
BURMEISTER & WAIN AMERICAN CORP.
Mystic, Conn.
LISTER-BLACKSTONE, INC.
42-32 21 Street
Long Island City 1, N. Y.
P & H DIESEL ENGINE DIV.
HARNISCHFEGER CORP.
500 S. Main St.
Crystal Lake, Ill.
READY-POWER CO.
POWER PLANT DIVISION
11231 Freud Ave.
Detroit 14, Mich.
WITTE ENGINE WORKS
OIL WELL SUPPLY DIV.
U. S. STEEL CORP.
2001 N. Lamar St.
Dallas 21, Texas

Axles

CLARK EQUIPMENT CO.
Buchanan-Jackson, Mich.

Bars, Bronze

See also headings under "Bronze"

BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio

Batteries, Diesel Locomotive

NICKEL CADMIUM BATTERY CORP.
Easthampton, Mass.

Batteries, Nickel Cadmium, Storage

NICKEL CADMIUM BATTERY CORP.
Easthampton, Mass.
NIFE, INC.
Lambert Ave.
Copiague, N. Y.

Batteries, Storage

DELCO-REMY DIVISION
GENERAL MOTORS CORP.
2401 Columbus Avenue
Anderson, Indiana
EXIDE INDUSTRIAL DIV.
THE ELECTRIC STORAGE BATTERY CO.
42 S. 15th St.
Philadelphia 2, Pa.
NICKEL CADMIUM BATTERY CORP.
Easthampton, Massachusetts
NIFE INC.
Lambert Ave.
Copiague, N. Y.

Battery Chargers

SUN ELECTRIC CORP.
Harlem and Avondale Aves.
Chicago 31, Ill.

Battery Charging Regulator

EXIDE INDUSTRIAL DIV.
ELECTRIC STORAGE BATTERY CO.
42 S. 15 St.
Philadelphia 2, Pa.

Bearings

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.
HOOVER BALL & BEARING CO.
326 E. Hoover Ave.
Ann Arbor, Mich.
THE TORRINGTON CO.
Field St.
Torrington, Conn.

Bearings, Aluminum

ALUMINUM CO. OF AMERICA
1501 Alcoa Bldg.
Pittsburgh 19, Pa.
AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BOHN ALUMINUM & BRASS CORP.
Detroit 26, Mich.
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
DETROIT ALUMINUM & BRASS CORP.
Detroit 11, Michigan
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Avenue
Detroit 13, Michigan
JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania
PIONEER MOTOR BEARING CO.
116 Beacon St.
South San Francisco, Calif.

Bearings, Babbitted

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
DETROIT ALUMINUM & BRASS CORP.
Detroit 11, Michigan
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.
PIONEER MOTOR BEARING CO.
116 Beacon St.
South San Francisco, Calif.

Bearings, Babbitted and Bronze Bushed

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE CO.
715 Spencer St.
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio
DETROIT ALUMINUM & BRASS CORP.
Detroit 11, Michigan
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.
PIONEER MOTOR BEARING CO.
116 Beacon St.
South San Francisco, Calif.

Bearings, Ball

HOOVER BALL & BEARING CO.
326 E. Hoover Ave.
Ann Arbor, Mich.

Bearings, Bronze

See also "Bronze Bearings"

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
CLEVITE SERVICE DIV.
CLEVELAND GRAPHITE BRONZE CO.
6545 Carnegie Ave.
Cleveland 3, Ohio
PIONEER MOTOR BEARING CO.
116 Beacon St.
South San Francisco, Calif.

Bearings, Bronze and Steel Backed, Babbitt-Lined

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE CO.
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
CLEVITE SERVICE DIV.
CLEVELAND GRAPHITE BRONZE CO.
6545 Carnegie Ave.
Cleveland 3, Ohio
DETROIT ALUMINUM & BRASS CORP.
Detroit 11, Michigan
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.
JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania
PIONEER MOTOR BEARING CO.
116 Beacon St.
South San Francisco, Calif.

Bearings, Carbon-Graphite

PURE CARBON CO., INC.
437 Hall Avenue
St. Marys, Pa.

Bearings, Copper-Lead

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BOHN ALUMINUM & BRASS CORP.
Detroit 26, Mich.
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
DETROIT ALUMINUM & BRASS CORP.
Detroit 11, Mich.
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.

Bearings, Lead-Bronze

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio

CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
DETROIT ALUMINUM & BRASS CORP.
Detroit 11, Mich.

Bearings, Needle Roller

TORRINGTON COMPANY
Field St.
Torrington, Conn.

Bearings, Piston Pin

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
CLEVITE SERVICE DIV.
CLEVELAND GRAPHITE BRONZE CO.
6545 Carnegie Ave.
Cleveland 3, Ohio
THE TORRINGTON CO.
12 Field St.
Torrington, Conn.

Bearings, Rebabbitted

GOLTEN MARINE CO., INC.
455 Carroll St.
Brooklyn 15, N. Y.
PIONEER MOTOR BEARING CO.
116 Beacon St.
South San Francisco, Calif.

Bearings, Roller

THE TORRINGTON CO.
BEARING DIVISIONS
Torrington, Conn.

Bearings, Self-Lubricating

BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio
HOOVER BALL & BEARING CO.
326 E. Hoover Ave.
Ann Arbor, Mich.
JOHNSON BRONZE COMPANY
470 South Mill Street
New Castle, Pennsylvania
TORRINGTON COMPANY
Field St.
Torrington, Conn.

Bearings, Sleeve, Copper-Lead Lined

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio
DETROIT ALUMINUM & BRASS CORP.
Detroit 11, Michigan

Bearings, Special Alloys

BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland, Ohio

Bearings, Steel-Backed, Copper-Lead Lined

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BOHN ALUMINUM & BRASS CORP.
Detroit 26, Mich.
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
CLEVITE SERVICE DIV.
CLEVELAND GRAPHITE BRONZE CO.
6545 Carnegie Ave.
Cleveland 3, Ohio
DETROIT ALUMINUM & BRASS CORP.
Detroit 11, Michigan
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.
JOHNSON BRONZE CO.
470 South Mill St.
New Castle, Pa.

Bearings, Thrust, Roller

THE TORRINGTON CO.
Field St.
Torrington, Conn.

Bearings, Wrist Pin

AMERICAN BEARING CORP.
429 So. Harding St.
Indianapolis 7, Ind.
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
THE TORRINGTON CO.
12 Field St.
Torrington, Conn.

Belting, Chain

DIAMOND CHAIN COMPANY, INC.
402 Kentucky Ave.
Indianapolis, Indiana

Belting, V-Type

UNITED STATES RUBBER CO.
MECHANICAL GOODS DIV.
1230 Avenue of the Americas
New York 20, N. Y.

Blowers, Centrifugal

AMERICAN AIR FILTER CO., INC.
215 Central Ave.
Louisville 8, Ky.
BROWN BOVERI CORP.
19 Rector St.
New York 6, N. Y.
DR. ALFRED J. BUCHI
U. S. Engineering Representative
Ernest G. Huber
1018 Munsey Bldg.
Washington 4, D. C.
ELLIOTT COMPANY
Jeannette, Pennsylvania

Blowers, Rotary, Positive

MIEHLE-DEXTER SUPERCHARGER DIV.
100 Fourth
Racine, Wisconsin

Blowers, Scavenging and Supercharging

See also "Superchargers"; "Turbochargers"
BROWN BOVERI CORP.
19 Rector St.
New York 6, N. Y.
DR. ALFRED J. BUCHI
U. S. Engineering Representative
Ernest G. Huber
1018 Munsey Bldg.
Washington 4, D. C.
ELLIOTT COMPANY
Jeannette, Pennsylvania
MIEHLE-DEXTER SUPERCHARGER DIV.
100 Fourth
Racine, Wisconsin
D. NAPIER & SON, LTD.
DuPont Circle Bldg.
1346 Connecticut Ave., N. W.
Washington 6, D. C.

Boilers, Exhaust Gas, Waste Heat

See also "Waste Heat Boilers"
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
ENGINEERING CONTROLS, INC.
Paul Brown Bldg.
818 Olive Street
St. Louis 1, Missouri
THE SIMS COMPANY
Box 1096
Erie, Pa.

Bolts

HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut
PAWTUCKET MFG. CO.
327 Pine St.
Pawtucket, R. I.

Bolts, High Tensile

HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut
PAWTUCKET MFG. CO.
327 Pine St.
Pawtucket, R. I.

Bronze Bar Stock, Completely Finished

BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
JOHNSON BRONZE CO.
470 S. Mill St.
New Castle, Pa.

Bronze Bearings

See also "Bearings, Bronze"
BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio

Bronze Washers

BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.

Brushes, Carbon

PURE CARBON CO., INC.
437 Hall Ave.
St. Marys, Pa.

Bushings, Bronze

BUNTING BRASS & BRONZE COMPANY
715 Spencer
Toledo 1, Ohio
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio

Bushings, Bronze (split, rolled)

FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.

Bushings, High-Lead Bronze

CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio
CLEVITE SERVICE DIV.
CLEVELAND GRAPHITE BRONZE CO.
6545 Carnegie Ave.
Cleveland 3, Ohio

FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.

Bushings, Lead-Bronze Lined
CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio

Bushings, Lead-Bronze Lined (Split Rolled)
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.

Bushings, Steel Backed Aluminum Lined
BOHN ALUMINUM & BRASS CORP.
Detroit 26, Mich.

Bushings, Steel-Backed, Babbitt-Lined
CLEVELAND GRAPHITE BRONZE CO.
(DIVISION OF CLEVITE CORP.)
17000 St. Clair Avenue
Cleveland 10, Ohio
PIONEER MOTOR BEARING CO.
116 Beacon St.
South San Francisco, Calif.

Bushings, Steel-Backed, Babbitt Lined (Split Rolled)
FEDERAL-MOGUL DIV.
FEDERAL-MOGUL-BOWER BEARINGS, INC.
11031 Shoemaker Ave.
Detroit 13, Mich.

Camshaft Drives, Roller-Chain
DIAMOND CHAIN COMPANY, INC.
402 Kentucky Ave.
Indianapolis, Indiana

Cam Followers
THE TORRINGTON CO.
Field St.
Torrington, Conn.

Camshaft Forgings
ELLWOOD CITY FORGE CO.
10 Street
Ellwood City, Pa.
THE PARK DROP FORGE CO.
777 East 79 St.
Cleveland 3, Ohio

Camshaft Grinders
VAN NORMAN AUTOMOTIVE EQUIPMENT CO.
3640 Main Street
Springfield 7, Mass.

Camshaft Reconditioning
MORCO INC.
23001 Aurora Ave.
Bedford, Ohio

Camshafts, Rebuilt & Reground
CLEVELAND HONE & MFG. CO.
8816 Harkness Rd.
Cleveland 6, Ohio

Cap Screws
CHICAGO SCREW COMPANY
2701 Washington Blvd.
Bellwood, Illinois

Carbon Brushes
PURE CARBON CO., INC.
437 Hall Avenue
St. Marys, Pa.

Carbon Monoxide Detector, Portable
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.

Carbon Solvents
See Also, "Solvents"
BRULIN & CO., INC.
2939-45 Columbia Ave.
Indianapolis 7, Ind.
OCTAGON PROCESS, INC.
51 Bank Street
Staten Island 1, N. Y.

Castings, Alloy Iron
GILLETT & EATON, INC.
846 Doughty St.
Lake City, Minn.
WHITE DIESEL ENGINE DIV.
THE WHITE MOTOR CO.
Springfield, Ohio

Castings, Aluminum
ALUMINUM CO. OF AMERICA
1501 Alcoa Bldg.
Pittsburgh 19, Pa.
GILLETT & EATON, INC.
846 Doughty St.
Lake City, Minnesota

Castings, Centrifugal, Cylinder Sleeve
PERFECT CIRCLE CORP.
552 So. Washington
Hagerstown, Ind.

Castings, Cracks Repaired
BRODIE SYSTEM, INC.
115 Clifton Pl.
Brooklyn 38, N. Y.

Castings, Cylinder Head, Alloy Iron
GILLETT & EATON, INC.
846 Doughty St.
Lake City, Minn.

Castings, Die
ALUMINUM CO. OF AMERICA
1501 Alcoa Bldg.
Pittsburgh 19, Pa.

Castings, Grey Iron
COOPER-BESSEMER CORP.
Mount Vernon, Ohio
WHITE DIESEL ENGINE DIV.
THE WHITE MOTOR CO.
Springfield, Ohio

Castings Repaired
METALOCK REPAIR SERVICE, INC.
36-15 48 Ave.
Long Island City 1, N. Y.

Castings, Special Alloy
INTERNATIONAL NICKEL CO., INC.
67 Wall St.
New York 5, N. Y.

Castings, Steel
ERIE FORGE & STEEL CORP.
1341 W. 16 St.
Erie, Pa.

Cast Iron Welding
BRODIE SYSTEM, INC.
115 Clifton Place
Brooklyn 38, N. Y.
RALPH STARK, INC.
43-12—33rd St.
Long Island City 1, N. Y.

Centrifugal Purifiers, Lube & Fuel Oil
See also headings under "Conditioners"; "Purifiers"; and "Separators"
CENTRICO, INC.
75 W. Forest Ave.
Englewood, N. J.
THE DE LAVAL SEPARATOR CO.
The De Laval Building
Poughkeepsie, N. Y.
THE SHARPLES CORP.
2300 Westmoreland St.
Philadelphia 40, Pa.

Centrifuges, Oil Purifying
See heading above.
CENTRICO, INC.
75 W. Forest Ave.
Englewood, N. J.
THE DE LAVAL SEPARATOR CO.
The De Laval Building
Poughkeepie, N. Y.
THE SHARPLES CORP.
2300 Westmoreland St.
Philadelphia 40, Pa.

Chain Drives, Complete
DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chains, Control
DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chains, Dual Engine Drive
DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chains, Power Transmission
DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chains, Roller
DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chains, Timing
See also "Timing Chains"
DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Chemical Feeders
MC CORD CORP.
Riopelle at E. Grand Blvd.
Detroit 11, Mich.

Chromium Plating
See also "Plating"
CHROMIUM CORP. OF AMERICA
100 Park Ave.
New York 17, N. Y.
NATIONAL FORGE & ORDNANCE CO.
Irvine, Warren County, Pa.
VAN DER HORST CORP. OF AMERICA
1313 E. State St.
Olean, N. Y.
Terrell, Texas & Chicago

Chromium Plating, Crankshafts
LANE PLATING WORKS
5322 Bonnie View Road
P. O. Box 9115
Dallas 15, Texas

Chromium Treated Parts
VAN DER HORST CORP. OF AMERICA
Olean, N. Y.
Terrell, Texas & Chicago

Clarifiers, Oil
See also headings under "Centrifugal Purifiers"; "Separators"
CENTRICO, INC.
75 W. Forest Ave.
Englewood, New Jersey
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Indiana
THE DE LAVAL SEPARATOR CO.
25 Columbia Street
Poughkeepsie, N. Y.
THE SHARPLES CORP.
2300 Westmoreland St.
Philadelphia 40, Pa.
WINSLOW ENGINEERING CO.
4069 Hollis St.
Oakland 8, Calif.

Cleaners, Air, Oil Bath Type
AMERICAN AIR FILTER CO., INC.
215 Central Ave.
Louisville 8, Ky.
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minn.

VORTOX COMPANY
121 S. Alexander Ave.
Claremont, Calif.

Cleaning Compounds
See also "Solvents", "Degreasers"
BRULIN & COMPANY, INC.
2939-45 Columbia Ave.
Indianapolis 7, Ind.
CLAYTON MFG. COMPANY
401 N. Temple City Boulevard
El Monte, California
OAKITE PRODUCTS, INC.
19 Rector Street
New York 6, N. Y.
OCTAGON PROCESS, INC.
51 Bank Street
Staten Island 1, N. Y.

Clutch Discs
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois

Clutches
ACTUATOR PRODUCTS CORP.
Main Street
West Concord, Mass.
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Ave.
Rockford, Illinois
TWIN DISC CLUTCH COMPANY
1328 Racine St.
Racine, Wisc.

Clutches, Air-Actuated
TWIN DISC CLUTCH COMPANY
Racine, Wisc.

Clutches, Automotive
LONG MFG. DIV.
BORG-WARNER CORP.
12501 Dequindre
Detroit 12, Mich.
ROCKFORD CLUTCH DIV.
BORG WARNER CORP.
1301 18th Ave.
Rockford, Ill.

Clutches, Friction and Jaw
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois

Clutches, Hydraulic
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Clutches, Miniature Jaw
BARBOUR STOCKWELL CO.
205 Broadway
Cambridge 39, Mass.

Clutches, Power Transmission
LONG MFG. DIV.
BORG-WARNER CORP.
12581 Dequindre
Detroit 12, Mich.
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Cold Weather Starter
START PILOT CORP.
61 Second St.
Mineola, N. Y.

Collector, Pre-cleaner
DONALDSON CO., INC.
666 Pelham Blvd.
St. Paul 14, Minn.
VORTOX COMPANY
121 S. Alexander Ave.
Claremont, Calif.

Compression Testers, Diesel Engine
See also "Indicators, Diesel Engine".
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.
KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Ave.
Franklin Park, Illinois
KISTLER INSTRUMENT CORP.
15 Webster St.
North Tonawanda, N. Y.

Compressors, Air
See also "Starting Air Compressors"
THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio
MIEHLE-DEXTER SUPERCHARGER DIV.
100 Fourth
Racine, Wisc.
QUINCY COMPRESSOR CO.
Dept. DP
Quincy, Illinois

Compressors, Reciprocating, Air and Gas, All Drives
CHICAGO PNEUMATIC TOOL CO.
6 East 44th Street
New York, N. Y.
THE COOPER-BESSEMER CORP.
Mt. Vernon, Ohio
INGERSOLL-RAND CO.
11 Broadway
New York 4, N. Y.
QUINCY COMPRESSOR CO.
Quincy, Ill.
WORTHINGTON CORP.
Worthington Ave.
Harrison, New Jersey

Condensers
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
ELLIOTT COMPANY
Jeannette, Pa.

Condensers, Atmospheric Evaporative Steam & Vapor
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine Wisc.

Condensers, Steam Turbine Driven Dry Air
ENGINEERING CONTROLS, INC.
Paul Brown Bldg.
818 Olive St.
St. Louis 1, Mo.

Conditioners, Fuel & Lube Oil
See also "Centrifugal Purifiers"; "Purifiers"; "Separators"; "Fuel Oil Additives"
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
THE DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.
WINSLOW ENGINEERING CO.
4069 Hollis St.
Oakland, Calif.

Conduit, Flexible & Liquid Tight
AMERICAN BRASS CO.
AMERICAN METAL HOSE DIV.
698 S. Main St.
Waterbury Conn.

Connecting Rod Borers
GREENLEE BROS. & CO.
1236 12th St.
Rockford, Ill.
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.

Connecting Rods, Forged
See also "Forgings"
ERIE FORGE & STEEL CORP.
1341 W. 16 St.
Erie, Penna.
THE PARK DROP FORGE COMPANY
777 E. 79 St.
Cleveland 3, Ohio

Connecting Rods, Rebuilt
CLEVELAND HONE & MFG. CO.
8816 Harkness Road
Cleveland 6, Ohio

Connecting Rod Pin Bushing Borer
GREENLEE BROS. & CO.
1236 12th St.
Rockford, Ill.

Control Panels
KATO ENGINEERING CO.
1443 First Ave.
Mankato, Minn.

Control Systems
MINNEAPOLIS-HONEYWELL REGULATOR CO.
INDUSTRIAL DIV.
Wayne & Windrim Aves.
Philadelphia 44, Pa.

Controls, Automatic Starting
See also "Automatic Controls"; "Alarm Systems"
FRANK W. MURPHY MFG., INC.
Box 1476
Tulsa, Okla.
SYNCHRO-START PRODUCTS
8151 N. Ridgeway Ave.
Skokie, Ill.
WESTINGHOUSE ELECTRIC CORP.
P. O. Box 868
Pittsburgh 30, Pa.

Controls, Engine Safety
AMOT CONTROLS CORP.
P. O. Box 1707
Richmond 1, Calif.
DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan
ILLINOIS TESTING LABS, INC.
420 N. LaSalle Street
Chicago 10, Illinois
MINNEAPOLIS-HONEYWELL REGULATOR CO.
INDUSTRIAL DIV.
Wayne & Windrim Aves.
Philadelphia 44, Pa.
FRANK W. MURPHY MFG., INC.
Box 1476
Tulsa 1, Okla.
PENN CONTROLS, INC.
Goshen, Indiana
ROBERTSHAW-FULTON CONTROLS CO.
FULTON-SYLPHON DIVISION
Knoxville 1, Tennessee
SYNCHRO-START PRODUCTS INC.
8151 N. Ridgeway Avenue
Skokie, Illinois

Controls, Hydraulic
WOODWARD GOVERNOR CO.
N. Second St.
Rockford, Ill.

Controls, Liquid Level
FRANK W. MURPHY MFG., INC.
Box 1476
Tulsa 1, Okla.
VIKING INSTRUMENTS, INC.
Towne St.
East Haddam, Conn.

Controls, Phase, for Multiple Pumps & Compressors
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Ave.
Skokie, Ill.

Controls, Pneumatic
WOODWARD GOVERNOR CO.
North Second St.
Rockford, Ill.

Controls, Pressure
DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan
FRANK W. MURPHY MFG., INC.
Box 1476
Tulsa 1, Okla.
PENN CONTROLS, INC.
Goshen, Indiana
VIKING INSTRUMENTS, INC.
Towne Street
East Haddam, Conn.
WOODWARD GOVERNOR CO.
North Second St.
Rockford, Illinois

Controls, Pressure Ratio
AIRESEARCH INDUSTRIAL DIV.
GARRETT CORP.
9225 Aviation Blvd.
Los Angeles 45, Calif.

Controls, Remote
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Ave.
Skokie, Ill.
WESTINGHOUSE ELECTRIC CORP.
P. O. Box 868
Pittsburgh 30, Pa.

Controls, Remote Throttle
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Ave.
Skokie, Ill.
VIKING INSTRUMENTS, INC.
Towne Street
East Haddam, Conn.
WOODWARD GOVERNOR CO.
North Second St.
Rockford, Ill.

Controls, Temperature
AMOT CONTROLS CORP.
1st St. & Nevin Ave.
Box 1707
Richmond 1, Calif.
DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan
ILLINOIS TESTING LABORATORIES, INC.
420 North LaSalle Street
Chicago 10, Illinois
FRANK W. MURPHY MFG., INC.
Box 1476
Tulsa 1, Okla.
PENN CONTROLS, INC.
Goshen, Indiana
THE POWERS REGULATOR CO.
3400 Oakton St.
Skokie, Illinois
ROBERTSHAW-FULTON CONTROLS CO.
FULTON SYLPHON DIVISION
Knoxville 1, Tennessee
VIKING INSTRUMENTS, INC.
Towne Street
East Haddam, Conn.

Controls, Vacuum
FRANK W. MURPHY MFG., INC.
Box 1476
Tulsa 1, Okla.

Converters
KATO ENGINEERING CO.
1443 First Ave.
Manhato, Minn.

Converters, Torque
LONG MFG. DIV.
BORG-WARNER CORP.
12501 Dequindre
Detroit 12, Mich.
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisconsin

Coolant Heaters
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
KIM HOTSTART MFG. CO.
917 W. Broadway
Spokane 1, Wash.

Coolers, Compressed Air, Gas
See also "Aftercoolers"
ENGINEERING CONTROLS, INC.
Paul Brown Bldg.
818 Olive St.
St. Louis 1, Mo.
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Coolers, Dry Air
ENGINEERING CONTROLS, INC.
Paul Brown Bldg.
818 Olive St.
St. Louis 1, Mo.

Coolers, Evaporative Type
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Coolers, Jacket Water
See also "Exchangers, Heat"; "Water Cooling Equipment"; and headings under "Heat Exchangers"; "Evaporators"
AEROFIN CORP.
101 Greenway Ave.
Syracuse 3, N. Y.
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
E. C. COOLEY CO.
1186 Folsom St.
San Francisco 3, Calif.
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
ENGINEERING CONTROLS, INC.
Paul Brown Bldg.
818 Olive St.
St. Louis 1, Mo.
PERFEX CORPORATION
500 W. Oklahoma Ave.
Milwaukee 7, Wisc.
ROSS HEAT EXCHANGER DIV.
OF AMERICAN STANDARD
Box 2081
Buffalo 5, N. Y.
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Coolers, Jacket Water, Materials for Cleaning
OAKITE PRODUCTS, INC.
22-C Rector St.
New York 6, N. Y.
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Coolers, Oil, Water
See also "Water Cooling Equipment"; "Exchangers, Heat" and headings under "Heat Exchangers".
AEROFIN CORP.
101 Greenway Ave.
Syracuse 3, N. Y.
E. C. COOLEY CO.
1186 Folsom St.
San Francisco 3, Calif.
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
ENGINEERING CONTROLS, INC.
Paul Brown Bldg.
818 Olive St.
St. Louis 1, Mo.
HARRISON RADIATOR DIV.
GENERAL MOTORS CORP.
Lockport, New York
LONG MFG. DIV.
BORG-WARNER CORP.
12501 Dequindre
Detroit 12, Mich.
PERFEX CORPORATION
500 W. Oklahoma Ave.
Milwaukee 7, Wisc.
ROSS HEAT EXCHANGER DIV.
OF AMERICAN STANDARD
Box 2081
Buffalo 5, N. Y.
THE SIMS COMPANY
P. O. Box 1096
Erie, Penna.
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisconsin

Coolers, Repair and Service
E. C. COOLEY CO.
1186 Folsom St.
San Francisco 3, Calif.

Cooling Equipment, Engine Radiators
See also "Radiators"
AEROFIN CORP.
101 Greenway Ave.
Syracuse 3, N. Y.
HARRISON RADIATOR DIVISION
GENERAL MOTORS CORP.
Lockport, New York
PERFEX CORPORATION
500 W. Oklahoma Ave.
Milwaukee 7, Wisc.

Cooling System Descaling Compounds
R. M. HOLLINGSHEAD CORP.
840 Cooper St.
Camden 2, N. J.
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Cooling System, High Temperature
ENGINEERING CONTROLS, INC.
Paul Brown Bldg.
818 Olive St.
St. Louis 1, Mo.

Cooling Water Treating Chemicals
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Corrosion Control, Water System
TREANOR CORP.
4012 Truman Rd.
Kansas City 27, Mo.

Corrosion Inhibitors
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Couplings
DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana
THOMAS FLEXIBLE COUPLING CO.
Main Avenue & Biddle Street
Warren, Pennsylvania

Couplings, Chain
DIAMOND CHAIN COMPANY, INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Couplings, Flexible
AJAX FLEXIBLE COUPLING CO., INC.
Portage & English St.
Westfield, N. Y.
DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis 7, Indiana
ELLIOTT COMPANY
Jeannette, Pa.
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
LOVEJOY FLEXIBLE COUPLING CO.
4866 W. Lake St.
Chicago 44, Ill.
THOMAS FLEXIBLE COUPLING CO.
Main Avenue & Biddle Street
Warren, Pennsylvania

Couplings, Flexible Shaft
DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis 7, Indiana
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
THOMAS FLEXIBLE COUPLING CO.
Main Ave. & Biddle St.
Warren, Pa.

Couplings, Floating Shaft Type
AJAX FLEXIBLE COUPLING CO., INC.
Portage & English St.
Westfield, N. Y.
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
THOMAS FLEXIBLE COUPLING CO.
Main Avenue & Biddle Street
Warren, Pa.

Couplings, Hydraulic
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisconsin

Couplings, Hydraulic, Quick Disconnect, Self Sealing
AEROQUIP CORP.
300 S. East Ave.
Jackson Mich.

Couplings, Roller Chain
DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis 7, Indiana

Couplings, Self-Aligning
AJAX FLEXIBLE COUPLING CO., INC.
Portage & English St.
Westfield, N. Y.
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
THOMAS FLEXIBLE COUPLING CO.
Main Avenue & Biddle Street
Warren, Pennsylvania

Couplings, Shaft, Rigid
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Md.

Crankcase Cleaning Materials
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Crankcase Forgings
THE PARK DROP FORGE CO.
777 E. 79
Cleveland 3, Ohio

Cranking Motors, Electric
See also "Starting Motors, Electric"
DELCO-REMY DIV.
GENERAL MOTORS CORP.
2401 Columbus Ave.
Anderson, Ind.
LEECE-NEVILLE COMPANY
1374 E. 51 St.
Cleveland 3, Ohio

Cranking Motors, Gasoline
HERCULES MOTOR CORP.
101 11th S. E.
Canton 2, Ohio

Crankshaft Bearings
CLEVELAND GRAPHITE BRONZE CO.
(DIV. OF CLEVITE CORP.)
17000 St. Clair Ave.
Cleveland 10, Ohio

Crankshaft, Chrome Plated
MORCO, INC.
22201 Aurora Rd.
Bedford, Ohio

Crankshaft Exchanged
MORCO INC.
22201 Aurora Road
Bedford, Ohio

Crankshaft Forgings
WYMAN-GORDON CO.
105 Madison St.
Worcester, Mass.

Crankshaft Grinders
VAN NORMAN AUTOMOTIVE
EQUIPMENT CO.
3640 Main Street
Springfield 7, Mass.
WINONA TOOL MFG. CO.
1430 W. 6th
Winona, Minn.

Crankshaft Grinding
LANE PLATING WORKS
5233 Bonnie View Rd.
P. O. Box 9115
Dallas 15, Texas

Crankshaft Machinists
BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, N. Y.
ELLWOOD CITY FORGE CO.
10th St.
Ellwood City, Pa.
GOLTEN MARINE CO., INC.
455 Carroll St.
Brooklyn 15, N. Y.
NATIONAL FORGE & ORDNANCE CO.
Irvine, Warren County, Pa.
WINONA TOOL MFG. CO.
1430 W. 6th
Winona, Minn.

Crankshaft, Plating
NATIONAL FORGE & ORDNANCE CO.
Irvine, Warren County, Pa.
VAN DER HORST CORP. OF AMERICA
Olean, New York
Terrell, Texas & Chicago

Crankshaft Repairs
See also "Repairs"
BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, N. Y.
CLEVELAND HONE & MFG. CO.
8816 Harkness Rd.
Cleveland 6, Ohio
GOLTEN MARINE CO., INC.
455 Carroll St.
Brooklyn 15, N. Y.
MORCO INC.
22201 Aurora Road
Bedford, Ohio
NATIONAL FORGE & ORDNANCE CO.
Irvine, Warren County, Pa.
WINONA TOOL MFG. CO.
1430 W. 6th
Winona, Minn.

Crankshafts
ELLWOOD CITY FORGE CO.
10th St.
Ellwood City, Pa.
ERIE FORGE & STEEL CORP.
1341 W. 16 St.
Erie, Pa.
MORCO, INC.
22201 Aurora Rd.
Bedford, Ohio
NATIONAL FORGE & ORDANCE CO.
Irvine, Warren County, Pa.
OHIO CRANKSHAFT CO.
4620 E. 71 St.
Cleveland 1, Ohio
THE PARK DROP FORGE CO.
777 E. 79
Cleveland 3, Ohio
WYMAN-GORDON CO.
105 Madison St.
Worcester, Mass.

Crankshafts Built-Up to Standard
BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York

Crankshafts, Chromium Plated
LANE PLATING WORKS
5322 Bonnie View Rd.
P. O. Box 9115
Dallas 15, Texas

Crankshafts, Hard Chromed & Ground
See also "Plating" & "Chromium Plating"
NATIONAL FORGE & ORDNANCE CO.
Irvine, Warren County, Pa.

Crankshafts, Hard Chrome Plated
CLEVELAND HONE & MFG. CO.
8816 Harkness Rd.
Cleveland 6, Ohio

Crankshafts, Metallized
BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York

Crankshafts, Nitride Hardened
NATIONAL FORGE & ORDNANCE CO.
Irvine, Warren County, Pa.

Crankshafts Reground
BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York
GOLTEN MARINE CO., INC.
455 Carroll St.
Brooklyn 15, N. Y.

Crankshafts Straightened
BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York

Crankshafts, Thermit Welded
BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York

Crawler-Tractors
INTERNATIONAL HARVESTER CO.
180 N. Michigan Ave.
Chicago 1, Ill.

Cutting Fluids
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Cutting Oils
NATIONAL REFINING CO.
P. O. Box 6479
Cleveland 1, Ohio
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Cylinder Heads, Cracks Repaired
METALOCK REPAIR SERVICE, INC.
36-15 48 Ave.
Long Island City 1, N. Y.

Cylinder Head Grinders
VAN NORMAN AUTOMOTIVE
EQUIPMENT CO.
3640 Main St.
Springfield 7, Mass.

Cylinder Heads Repaired
SALSBURY CORP.
1161 E. Florence Ave.
Los Angeles 1, Calif.
RALPH STARK, INC.
43-12 33rd St.
Long Island City 1, N. Y.

Cylinder Liner Pullers
KENT-MOORE ORGANIZATION, INC.
28625 Mound Rd.
Warren, Mich.

Cylinder Liners
DAROS AMERICAN CORP.
8128 N. Lawndale Ave.
Skokie, Illinois

SEALED POWER CORP.
2001 Sanford St.
Muskegon, Mich.

Cylinder Liners Reclaimed

BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York
CHROMIUM CORP. OF AMERICA
100 Park Ave.
New York 17 N. Y.
VAN DER HORST CORP. OF AMERICA
Olean, New York
Terrell, Texas & Chicago

Cylinder Liners Repaired

BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York

Cylinders, Bored & Finished

BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York

Cylinders Hydraulic

ERIE FORGE & STEEL CORP.
1341 W. 16 St.
Erie, Pa.

Cylinders Repaired

BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York
RALPH STARK, INC.
43-12 33rd St.
Long Island City 1, N. Y.

Damper, Torsional Vibration

See also "Vibration"
HOUDAILLE INDUSTRIES, INC.
BUFFALO HYDRAULICS DIV.
537 E. Delavan Ave.
Buffalo 11, N. Y.
SCHWITZER CORP.
1125 Massachusetts Avenue
Indianapolis 7, Indiana

Dehydrators, Diesel Fuel

THE BRIGGS FILTRATION CO.
River Rd.
Washington 16, D. C.
THE DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.

Detergents

BRULIN & COMPANY, INC.
2939-45 Columbia Ave.
Indianapolis 7, Ind.
OAKITE PRODUCTS, INC.
22 C Rector St.
New York 6, N. Y.
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Detonation Indicator

KISTLER INSTRUMENT CORP.
15 Webster St.
North Tonawanda, N. Y.

Dew Point Meters

ILLINOIS TESTING LABORATORIES, INC.
420 North LaSalle Street
Chicago 10, Illinois

Diesel Buses

AMERICAN M-A-N CORPORATION
149 Broadway
New York 6, N. Y.

Diesel Cylinder Pressure Indicators

KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Ave.
Franklin Park, Ill.

Diesel Engines

CONTINENTAL MOTORS CORP.
205 Market St.
Muskegon Mich.

Diesel Engine Lubricating Oil

See also "Lubricating Oils"
CITIES SERVICE OIL CO.
60 Wall Tower
New York 5, N. Y.
NATIONAL REFINING CO.
P. O. Box 6479
Cleveland 1, Ohio
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.
THE TEXAS COMPANY
135 East 42nd Street
New York 17, N. Y.

Diesel Engines, Reconditioned

See also "Repairs Diesel"
BRODIE SYSTEM
115 Clifton Place
Brooklyn 38, New York
STEWART & STEVENSON SERVICES, INC.
4516 Harrisburg
Houston, Texas

Diesel Farm Tractors

AMERICAN M-A-N CORPORATION
149 Broadway
New York 6, N. Y.
BUDA DIV.
ALLIS-CHALMERS MFG. CO.
1135 S. 70 St.
Milwaukee 1, Wisc.
DIESEL ENERGY CORP.
82 Beaver St.
New York 5, N. Y.
INTERNATIONAL HARVESTER CO.
180 N. Michigan Ave.
Chicago 1, Ill.

Diesel Fuel Injector Repair

INTERSTATE DIESEL SERVICE, INC.
2093 East 19 St.
Cleveland 15, Ohio

Diesel Fuel Oil Tar & Carbon Dispersing Agent

E. I. DU PONT DE NEMOURS & CO., INC.
PETROLEUM CHEMICAL DIV.
Wilmington 98, Del.
R. S. NORRIS & ASSOCIATES
26 Valley Rd.
Larchmont, N. Y.
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Diesel Generating Sets

See also "Auxiliary Diesel Generating Sets"; "Emergency Diesel Generators"; "Emergency Lighting Plants"; "Generator Sets, Electric".
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
AMERICAN M-A-N CORPORATION
149 Broadway
New York 6, N. Y.
AMERICAN MARC, INC.
1601 West Florence Ave.
Inglewood, Calif.
BALDWIN-LIMA-HAMILTON CORP.
N. 3rd St.
Hamilton, Ohio
BRUSH ABOE, INC.
60-07 39th Ave.
Woodside 77, N. Y.
THE BUDA DIVISION
ALLIS-CHALMERS MFG. CO.
1135 S. 70 St.
Milwaukee 1, Wisc.
BURMEISTER & WAIN AMERICAN CORP.
Mystic, Conn.
CHICAGO PNEUMATIC TOOL CO.
6 East 44 St.
New York 17, N. Y.
COOPER-BESSEMER CORP.
Mount Vernon, Ohio
DIESEL ENERGY CORP.
82 Beaver St.
New York 5, N. Y.
ELECTRO-MOTIVE DIV.
GENERAL MOTORS CORP.
La Grange, Ill.
ENTERPRISE ENGINE & MACH. CO.
18th & Florida Streets
San Francisco 10, Calif.
INGERSOLL-RAND COMPANY
11 Broadway
New York 4, New York
LISTER-BLACKSTONE, INC.
42-32 21st St.
Long Island City 1, N. Y.
MASCHINENBAU KIEL AKTIENGESELLSCHAFT
Kiel-Friedrichsort
Germany (Western)
NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 1, Wisconsin
P & H DIESEL DIVISION
HARNISCHFEGER CORPORATION
500 So. Main St.
Crystal Lake, Illinois
F. PERKINS (CANADA) LTD.
60 Wingold Ave.
Toronto 10, Ontario
THE READY-POWER CO.
11231 Freud Ave.
Detroit 14, Mich.
R. H. SHEPPARD CO., INC.
Hanover, Pennsylvania
VENN-SEVERIN ENGINE WORKS, INC.
12822 Simms Ave.
Hawthorne Calif.
WAUKESHA MOTOR CO.
W. St. Paul Ave.
Waukesha, Wisc.
WITTE ENGINE WORKS
OIL WELL SUPPLY DIV.
U. S. STEEL CORP.
2001 N. Lamar St.
Dallas 21, Texas
WORTHINGTON CORPORATION
Worthington Ave.
Harrison, New Jersey

Diesel Industrial Tractors

AMERICAN M-A-N CORP.
149 Broadway
N. Y. 16, N. Y.
BUDA DIV.
ALLIS-CHALMERS MFG. CO.
1135 S. 70 St.
Milwaukee 1, Wisc.

Diesel Locomotives, Electrical and Mechanical Drive

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.
ELECTRO-MOTIVE DIV. OF GM
La Grange, Ill.

Diesel Nozzle Testers

See also "Nozzle Testers", "Test Stands"
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.
C.A.V. (Fuel Injection Equipment) DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Ave.
Cleveland 7, Ohio
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.
KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Avenue
Franklin Park, Illinois
KISTLER INSTRUMENT CORP.
15 Webster St.
North Tonawanda, N. Y.

Diesel Power Units

See also "Power Units"
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

AMERICAN MARC, INC.
1601 W. Florence Ave.
Inglewood, Calif.
BUDA DIVISION
ALLIS-CHALMERS MFG. CO.
1135 S. 70 St.
Milwaukee 1, Wisc.
BURMEISTER & WAIN AMERICAN CORP.
Mystic, Conn.
CHICAGO PNEUMATIC TOOL CO.
6 East 44 St.
New York 17, N. Y.
COOPER-BESSEMER CORP.
Mount Vernon, Ohio
DETROIT DIESEL ENGINE DIV.
GENERAL MOTORS CORP.
13400 W. Outer Drive
Detroit 28, Mich.
DIESEL ENERGY CORP.
82 Beaver St.
New York 5, N. Y.
ENTERPRISE ENGINE & MACH. CO.
18th & Florida Streets
San Francisco, California
FAIRBANKS MORSE & CO.
600 South Michigan Ave.
Chicago 5, Illinois
HERCULES MOTOR CORP.
101-11th S. E.
Canton 2, Ohio
INGERSOLL-RAND COMPANY
11 Broadway
New York 4, New York
INTERNATIONAL HARVESTER CO.
180 N. Michigan Ave.
Chicago 1, Ill.
NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 1, Wisconsin
F. PERKINS (CANADA) LTD.
60 Wingold Ave.
Toronto 10, Ontario
R. H. SHEPPARD CO., INC.
Hanover, Pa.
STEWART & STEVENSON SERVICES, INC.
4516 Harrisburg
Houston, Texas
VENN-SEVERIN ENGINE WORKS, INC.
12822 Simms Ave.
Hawthorne, Calif.
WAUKESHA MOTOR CO.
W. St. Paul Ave.
Waukesha, Wisc.
WITTE ENGINE WORKS
OIL WELL SUPPLY DIVISION
UNITED STATES STEEL CORP.
2001 N. Lamar St.
Dallas 21, Texas
WORTHINGTON CORP.
Worthington Ave.
Harrison, N. J.

Diesel Pumping Units

See also "Pumping Units"

AMERICAN MARC, INC.
1601 West Florence Ave.
Inglewood, Calif.
BALDWIN-LIMA-HAMILTON CORP.
N. 3rd St.
Hamilton, Ohio
BUDA DIV.
ALLIS-CHALMERS MFG. CO.
1135 S. 70 St.
Milwaukee 1, Wisc.
BURMEISTER & WAIN AMERICAN CORPORATION
Mystic, Conn.
CHICAGO PNEUMATIC TOOL CO.
6 East 44 St.
New York 17, N. Y.
ENTERPRISE ENGINE & MACH. CO.
18th & Florida Streets
San Francisco 10, California
INGERSOLL-RAND COMPANY
11 Broadway
New York 4, New York
MAK MASCHINENBAU KIEL AKTIENGESELLSCHAFT
Kiel-Friedrichsort
Germany (Western)
R. H. SHEPPARD CO., INC.
Hanover, Pa.

Diesel Railway Generating Sets

NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 1, Wisconsin
WAUKESHA MOTOR CO.
West St. & Paul Ave.
Waukesha, Wisc.
WITTE ENGINE WORKS
OIL WELL SUPPLY DIV.
U. S. STEEL CORP.
2001 N. Lamar St.
Dallas 21, N. Y.

Diesel Schools

UTILITIES ENGINEERING INSTITUTE DIESEL DIVISION
2525 N. Sheffield Avenue
Chicago 14, Ill.

Diesel Starting Fluid

SPRAY PRODUCTS CORP.
P. O. Box 584
Camden, N. J.

Diesel Testing Equipment

See also "Test Stands"

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Penna.
KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Avenue
Franklin Park, Illinois
KISTLER INSTRUMENT CORP.
15 Webster St.
North Tonawanda, N. Y.

Diesel Timing Light

SUN ELECTRIC CORP.
Harlem & Avondale Aves.
Chicago 31, Ill.

Diesel Truck-Tractors

AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.
DIESEL ENERGY CORP.
82 Beaver St.
New York 5, N. Y.

Drills, Portable Electric

CHICAGO PNEUMATIC TOOL CO.
6 East 44 St.
New York 17, N. Y.
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

Drives, Accessory

SCHWITZER CORP.
1125 Massachusetts Ave.
Indianapolis 7, Ind.

Drives, Chain

DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis, Ind.

Drives, Gear

BRAD FOOTE GEAR WORKS
1315 South Cicero Ave.
Cicero 50, Illinois

Drives, Starter

ECLIPSE MACHINE DIV.
BENDIX AVIATION CORP.
Elmira, N. Y.

Drives, V-Belt

UNITED STATES RUBBER CO.
MECHANICAL GOODS DIV.
1230 Avenue of the Americas
New York 20, N. Y.

Dual Chain Engine Drives

DIAMOND CHAIN CO., INC.
402 Kentucky Avenue
Indianapolis 7, Indiana

Dynamometers, Chassis

CLAYTON MFG. CO.
El Monte, Calif.

Dynamometers, Engine Testing

CLAYBORNE MANUFACTURING CO.
429 North Main Street
Monticello, Indiana
CLAYTON MFG. CO.
El Monte, Calif.

Dynamometers and Prony Brakes

CLAYTON MFG. CO.
El Monte, Calif.

Electrical Connectors

COLE-HERSEE CO.
20 Old Colony Ave.
South Boston 27, Mass.
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York

Emergency Diesel Generator Systems

See also "Auxiliary Diesel Generator Sets"; "Diesel Generating Sets"; "Emergency Lighting Plants".

ALLIS-CHALMERS
BUDA DIVISION
1135 S. 70 St.
Milwaukee 1, Wisc.
BURMEISTER & WAIN AMERICAN CORP.
Mystic, Conn.
DETROIT DIESEL ENGINE DIV.
GENERAL MOTORS CORP.
13400 W. Outer Dr.
Detroit 28, Mich.
DIESEL ENERGY CORP.
82 Beaver St.
New York 5, N. Y.
ENTERPRISE ENGINE & MACH. CO.
18th & Florida Streets
San Francisco, California
INTERNATIONAL FERMONT MACH. CO., INC.
Ramapo, N. Y.
NORDBERG MFG. CO.
3073 S. Chase Ave.
Milwaukee 1, Wisc.
P&H DIV.
HARNISCHFEGER CORP.
500 S Main
Crystal Lake, Ill.
THE READY-POWER CO.
11231 Freud Ave.
Detroit 14, Mich.
R. H. SHEPPARD CO., INC.
Hanover, Pa.
WAUKESHA MOTOR CO.
West St. & St. Paul Ave.
Waukesha Wisc.
WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
1401 Sheridan Avenue
Springfield, Ohio
WITTE ENGINE WORKS
OIL WELL SUPPLY DIV.
U. S. STEEL CORP.
2001 N. Lamar St.
Dallas 21, Tex.

Emergency Lighting Batteries

NIFE INC.
Lambert Ave.
Copiague, N. Y.

Emergency Lighting Plants

See also heading above.

ALLIS-CHALMERS
BUDA DIVISION
1135 S. 70 St.
Milwaukee 1, Wisc.
BURMEISTER & WAIN AMERICAN CORP.
Mystic, Conn.
LISTER-BLACKSTONE, INC.
42-32 21 St.
Long Island City 1, N. Y.
THE READY-POWER CO.
11231 Freud Ave.
Detroit 14, Mich.

R. H. SHEPPARD CO., INC.
Hanover, Pa.
WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
1401 Sheridan Avenue
Springfield, Ohio
WITTE ENGINE WORKS
OIL WELL SUPPLY DIV.
U. S. STEEL CORP.
2001 N. Lamar St.
Dallas 21, Texas

Emergency Lighting Systems
EXIDE INDUSTRIAL DIV.
THE ELECTRIC STORAGE BATTERY CO.
42 S. 15 St.
Philadelphia 2, Pa.

Enclosed Gear Drives
BRAD FOOTE GEAR WORKS
1315 South Cicero Ave.
Cicero 50, Illinois

Engine Blocks, Cracks Repaired
METALOCK REPAIR SERVICE, INC.
36-15 48th Ave.
Long Island City 1, N. Y.

Engine Bolts, Nuts and Studs
GREER STOP NUT CO.
2620 W. Flournoy St.
Chicago 12, Ill.

Engine, Coolant Pre-Heater, Electric
KIM HOTSTART MFG. CO.
917 W. Broadway
Spokane 1, Wash.

Engine Cooling System Cleaners
YOUNG RADIATOR CO.
Racine, Wisc.

Engine Cooling System Rust Preventives
SALSBURY CORP.
1161 E. Florence Ave.
Los Angeles 1, Calif.
YOUNG RADIATOR CO.
Racine, Wisc.

Engine Starting Primer
START PILOT CORP.
61 Second St.
Mineola, N. Y.

Engine Valves
EATON MANUFACTURING CO.
VALVE DIVISION
9771 French Rd.
Detroit 13, Mich.

Engines, Diesel
CONTINENTAL MOTORS CORP.
205 Market St.
Muskegon, Mich.

Engines, Diesel, Used
VENN-SEVERIN ENGINE WORKS, INC.
12822 Simms Ave.
Hawthorne, Calif.
WAUKESHA MOTOR CO.
West St. & Paul Ave.
Waukesha, Wisc.

Engine Frames, Cracks Repaired
METALOCK REPAIR SERVICE INC.
36-15 48th Avenue
Long Island City 1, N. Y.

Engines, Industrial
F. PERKINS (CANADA) LTD.
60 Wingold Ave.
Toronto, Ontario

Engines, Marine
F. PERKINS (CANADA) LTD.
60 Wingold Ave.
Toronto, Ontario

Engines, Run-In Stands
CLAYTON MFG. CO.
El Monte, Calif.

Evaporators
See also "Coolers"
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
THE MAXIM SILENCER CO.
SUBSIDIARY, EMHART MFG. CO.
85 Homestead Ave.
Hartford, Conn.

Evaporators, Exhaust Gas
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.

Evaporators, Steam
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
THE MAXIM SILENCER CO.
SUBSIDIARY, EMHART MFG. CO.
85 Homestead Ave.
Hartford, Conn.

Exchange Fuel Injector Service
INTERSTATE DIESEL SERVICE, INC.
2093 East 19 St.
Cleveland 15, Ohio

Exchangers, Heat
See also "Water Cooling Equipment" and headings under "Coolers" and "Heat Exchangers".
AEROFIN CORP.
101 Greenway Ave.
Syracuse 3, N. Y.
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.
E. C. COOLEY CO.
1186 Folsom St.
San Francisco 3, Calif.
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
HARRISON RADIATOR DIVISION
GENERAL MOTORS CORP.
Washburn Street
Lockport, New York
LONG MANUFACTURING DIV.
BORG-WARNER CORP.
12581 Dequindre
Detroit 12, Mich.
PERFEX CORPORATION
500 West Oklahoma Ave.
Milwaukee 7, Wisc.
ROSS HEAT EXCHANGER DIV.
OF AMERICAN STANDARD
Box 2081
Buffalo 5, N. Y.
YOUNG RADIATOR COMPANY
709 S. Marquette St.
Racine, Wisconsin

Exchangers, Heat, Materials for Cleaning
See also headings under "Cleaners"; "Cooler"; "Cooling"; and "Engines"
OAKITE PRODUCTS, INC.
22C Rector Street
New York 6, N. Y.

Exhaust Gas Economizer
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.

Expansion Joints
BADGER MANUFACTURING CO.
230 Bent St.
Cambridge, Mass.

Expansion Joints, Corrugated, Stainless Steel
FLEXONICS CORP.
1363 S. 3rd Ave.
Maywood, Ill.
UNITED STATES RUBBER CO.
MECHANICAL GOODS DIV.
1230 Avenue of the Americas
New York 20, N. Y.

Fan Drives, Modulated & Thermo-Modulated
SCHWITZER CORP.
1125 Massachusetts Ave.
Indianapolis 7, Ind.

Fan Drives, Thermatic
SCHWITZER CORP.
1125 Massachusetts Avenue
Indianapolis 7, Indiana

Fans, Axial Flow
SCHWITZER CORP.
1125 Massachusetts Avenue
Indianapolis 7, Indiana

Fans, Centrifugal
AMERICAN AIR FILTER CO., INC.
215 Central Ave.
Louisville 8, Ky.

Fans, Radiator Cooling
See also "Radiators"
KOPPERS COMPANY, INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
SCHWITZER CORP.
1125 Massachusetts Ave.
Indianapolis 7, Indiana

Ferrous Plating
VAN DER HORST CORP.
1313 E. State St.
Olean, N. Y.

Fill Signals
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, N. Y.

Filter Cartridges
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.

Filter Elements, Fuel Oil
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.

Filter Elements, Lube Oil
COMMERCIAL FILTERS CORP.
2 Main St.
Melrose 76, Mass.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.

Filtering Systems
LUBER FINER INC.
2514 So. Grand
Los Angeles 7, Calif.
PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, New Jersey

Filter, Lubricating Oil, Magnetic
WINSLOW ENGINEERING & MFG. CO.
4069 Hollis St.
Oakland 8, Calif.

Filters, Air
See also "Air Filters"; and Headings under
AMERICAN AIR FILTER CO., INC.
215 Central Ave.
Louisville 8, Ky.
THE BRIGGS FILTRATION CO.
River Road
Washington 16, D. C.
DONALDSON COMPANY INC.
666 Pelham Blvd.
St. Paul 14, Minn.
FRAM CORPORATION
Providence 16, Rhode Island
PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey

VORTOX CO.
121 S. Alexander Ave.
Claremont, Calif.
WINSLOW ENGINEERING & MFG. CO.
4069 Hollis St.
Oakland 8, Calif.

Filters, Air, Automatic Self-Cleaned

AIR-MAZE CORPORATION
25000 Miles Road
Cleveland 28, Ohio
AMERICAN AIR FILTER CO.
215 Central Ave.
Louisville 8, Ky.
DONALDSON COMPANY INC.
666 Pelham Blvd.
St. Paul 14, Minn.

Filters, Air, Dry Type

AMERICAN AIR FILTER CO., INC.
215 Central Ave.
Louisville 8, Ky.
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minn.
FRAM CORPORATION
Providence 16, R. I.
WIX CORPORATION
Gastonia, N. C.

Filters, Air, Dry Type (Crankcase)

PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, N. J.
VORTOX CO.
121 S. Alexander Ave.
Claremont, Calif.

Filters, Air, Oil Bath Type

AIR MAZE CORP.
25000 Miles Road
Cleveland 28, Ohio
AMERICAN AIR FILTER CO.
215 Central Ave.
Louisville 8, Ky.
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minnesota
VORTOX COMPANY
121 South Alexander Avenue
Claremont, California

Filters, Air, Open-Screen Type

DONALDSON COMPANY INC.
666 Pelham Blvd.
St. Paul 14, Minn.

Filters, Air, Panel Type

AIR-MAZE CORPORATION
25000 Miles Road
Cleveland 28, Ohio
AMERICAN AIR FILTER CO.
215 Central Ave.
Louisville 8, Ky.
VORTOX COMPANY
121 South Alexander Avenue
Claremont, California

Filters, (Centrifugal) Lube Oil

THE DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.

Filters, Compressed Air

AMERICAN AIR FILTER CO.
215 Central Ave.
Louisville 8, Ky.
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
CUNO ENGINEERING CORP.
64 S. Vine St.
Meriden, Connecticut
INDIANA COMMERCIAL FILTER CORP.
Lebanon Ind.
PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey

Filters, Cooling System

R. M. HOLLINGSHEAD CORP.
840 Cooper St.
Camden 2, N. J.

Filters, Cutting Oil

COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
INDIANA COMMERCIAL CORP.
Lebanon, Ind.

Filters, 5-Micron, Diesel Fuel

BRIGGS FILTRATION CO.
River Road
Washington 16, D. C.
C.A.V. FUEL INJECTION EQUIP. DIV.
LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Ave.
Cleveland 7, Ohio
COMMERCIAL FILTER CORPORATION
2 Main St.
Melrose 76, Massachusetts
CUNO ENGINEERING CORP.
64 S. Vine St.
Meriden, Conn.
LUBER-FINER, INC.
2514 S. Grand Avenue
Los Angeles 7, California
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois
PUROLATOR PRODUCTS, INC.
970 New Brunswick Avenue
Rahway, New Jersey
WINSLOW ENGINEERING CO.
4069 Hollis St.
Oakland, Calif.

Filters, Fuel Oil

AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield 7, Mass.
BRIGGS FILTRATION COMPANY
River Rd.
Washington 16, D. C.
COMMERCIAL FILTER CORP.
2 Main Street
Melrose 76, Massachusetts
CUNO ENGINEERING CORP.
64 S. Vine St.
Meriden, Conn.
ENGINE LIFE PRODUCTS
115 S. Granada
El Monte, Calif.
FRAM CORP.
Providence 16, Rhode Island
THE HILLIARD CORP.
120 West 4th Street
Elmira, N. Y.
HOFFMAN-ALLEN CORP.
1400 E. Tampa
Springfield, Mo.
LUBER-FINER, INC.
2514 South Grand Ave.
Los Angeles, California
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois
PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, N. J.
ROBERT BOSCH CORP.
268 4th Ave.
New York 10, N. Y.
WINSLOW ENGINEERING CO.
4069-73 Hollis Street
Oakland 8, Calif.
WIX CORPORATION
Gastonia, N. C.

Filters, Gasoline

COMMERCIAL FILTER CORP.
2 Main Street
Melrose 76, Massachusetts
CUNO ENGINEERING CORP.
64 S. Vine St.
Meriden, Connecticut
FRAM CORP.
Providence 16, R. I.
HOFFMAN ALLEN CORP.
1400 E. Tampa
Springfield, Mo.
LUBER-FINER, INC.
2514 S. Grand Avenue
Los Angeles 7, Calif.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois
PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, New Jersey
WINSLOW ENGINEERING CO.
4069 Hollis St.
Oakland, Calif.

Filters, Lubricating Oil

AIR MAZE CORP.
25000 Miles Road
Cleveland 28, Ohio
BRIGGS FILTRATION COMPANY
River Rd.
Washington 16, D. C.
COMMERCIAL FILTER CORP.
2 Main Street
Melrose 76, Mass.
CUNO ENGINEERING CORP.
64 S. Vine St.
Meriden, Conn.
ENGINE LIFE PRODUCTS
115 S. Granada
El Monte, Calif.
FRAM CORP.
Providence 16, Rhode Island
THE HILLIARD CORP.
120 West 4th Street
Elmira, N. Y.
HOFFMAN ALLEN CORP.
1400 E. Tampa
Springfield, Mo.
LUBER-FINER, INC.
2514 South Grand Ave.
Los Angeles, California
WM. N. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois
PUROLATOR PRODUCTS, INC.
970 New Brunswick Ave.
Rahway, N. J.
WINSLOW ENGINEERING CO.
4069-73 Hollis Street
Oakland 8, Calif.
WIX CORPORATION
Gastonia, N. C.

Filters, Panel Type

VORTOX COMPANY
121 S. Alexander Ave.
Claremont, Calif.

Filtering Systems

COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Fittings, Hose, Detachable

AEROQUIP CORP.
300 S. East Ave.
Jackson, Mich.

Flexible Connections, Stainless Steel

See also headings under "Hose" and "Tubing"

THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIV.
698 S. Main St.
Waterbury 20, Conn.
ATLANTIC METAL HOSE CO. INC.
309 Dyckman Street
New York 34, New York

Flexible Drives
ACTUATOR PRODUCTS CORP.
Main Street
West Concord, Mass.
BARBOUR STOCKWELL CO.
205 Broadway
Cambridge 39, Mass.

Flexible Exhaust Connections
See also headings under "Hose" and "Tubing"
THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIV.
698 S. Main St.
Waterbury 20, Conn.
ATLANTIC METAL HOSE CO., INC.
309 Dyckman Street
New York 34, New York

Flexible Metal Hose
See also "Hose, Flexible, Metallic"; "Tubing"
AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIVISION
698 South Main Street
Waterbury 20, Connecticut
ATLANTIC METAL HOSE CO., INC.
309 Dyckman Street
New York 34, New York
FLEXONICS CORPORATION
1363 S. 3rd Ave.
Maywood, Ill.

Flexible Metal Hose, Fuel Oil, Lubricating Oil, Compressed Air
See also headings under "Hose" and "Tubing".
THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIVISION
698 South Main Street
Waterbury 20, Conn.
ATLANTIC METAL HOSE CO., INC.
309 Dyckman Street
New York 34, New York

Flexible Shafts
ALBERTSON & COMPANY
Sioux City, Iowa

Fluid Drive
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Fluid Diesel Starting
SPRAY PRODUCTS CORP.
P. O. Box 584
Camden, N. J.

Forged Crankshafts
ELLWOOD CITY FORGE CO.
10th Street
Ellwood City, Pa.
WYMAN-GORDON COMPANY
105 Madison St.
Worcester 1, Mass.

Forgings, Aluminum
ALUMINUM COMPANY OF AMERICA
1501 Alcoa Bldg.
Pittsburgh 19, Penna.
WYMAN-GORDON COMPANY
105 Madison Street
Worcester 1, Mass.

Forgings, Drop
THE PARK DROP FORGE COMPANY
Cleveland 3, Ohio
WYMAN-GORDON COMPANY
105 Madison Street
Worcester 8, Mass.

Forgings, Iron & Steel
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
ELLWOOD CITY FORGE COMPANY
10th Street
Ellwood City, Pa.
ERIE FORGE AND STEEL CORP.
1341 W. 16th Street
Erie, Pa.
WYMAN-GORDON COMPANY
105 Madison Street
Worcester 1, Mass.

Friction Snubbers
HOUDAILLE INDUSTRIES, INC.
BUFFALO HYDRAULICS DIV.
537 E. Delavan Ave.
Buffalo 11, N. Y.

Fuel Injection Replacement Parts
UNEX PRODUCTS CORP.
1841 Broadway
New York 23, N. Y.

Fuel Injection Systems, Gasoline
ECLIPSE MACHINE DIV.
BENDIX AVIATION CORP.
Elmira, N. Y.

Fuel Injection Systems, Repair & Service
INTERSTATE DIESEL SERVICE, INC.
2093 East 19 St.
Cleveland 15, Ohio
UNEX PRODUCTS CORP.
1841 Broadway
New York 23, N. Y.

Fuel Oil Additives
See also "Conditioners"
E. I. DU PONT DE NEMOURS & CO., INC.
PETROLEUM CHEMICAL DIV.
Wilmington 98, Del.
LUBOID COMPANY
3270 S. Third St.
Milwaukee 7, Wisc.
R. S. NORRIS & ASSOCIATES
26 Valley Road
Larchmont, N. Y.

Fuel Oil, Diesel
See also "Oils, Diesel Fuels".
CITIES SERVICE OIL CO.
60 Wall Tower
New York 5, N. Y.
STANDARD OIL CO. (INDIANA)
910 South Michigan Ave.
Chicago 80, Illinois

Fuel Oil Heaters, Diesel
ROSS HEAT EXCHANGER DIV.
AMERICAN STANDARD
Box 2081
Buffalo 5, N. Y.

Fuel Oil Tar and Carbon Dispersing Agent
R. S. NORRIS & ASSOCIATES
26 Valley Rd.
Larchmont, N. Y.
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Fuel Oil Treatment, Diesel
CENTRICO, INC.
75 West Forest Ave.
Englewood, N. J.
LUBOID COMPANY
3270 S. Third St.
Milwaukee 7, Wisc.
R. S. NORRIS & ASSOCIATES
26 Valley Road
Larchmont, N. Y.
WINSLOW ENGINEERING & MFG. CO.
4069 Hollis St.
Oakland 8, Calif.

Gages, Air Pressure
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Gages, Draft, Portable Indicating
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Gages, Fuel
LIQUIDOMETER CORP.
41-03 36 St.
Long Island City 1, N. Y.
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Gages, Liquid Level
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.
LIQUIDOMETER CORP.
41-03 36th St.
Long Island City 1, N. Y.
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Gages, Oil Pressure
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Gages, Tank Contents
LIQUIDOMETER CORP.
41-03 36th St.
Long Island City 1, N. Y.
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Gages, Temperature
See also, "Thermometers".
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Gages, Vacuum
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, N. Y.

Gaskets
THE DARCOID CO., INC.
145-6th Ave.
New York 13, N. Y.
THE FITZGERALD MFG. CO.
Torrington, Conn.
VELLUMOID COMPANY
Worcester, Mass.
WISCONSIN GASKET & MFG. CO.
Granville, Wisconsin

Gaskets, Asbestos
See also, "Asbestos Sheet".
VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.
WISCONSIN GASKET & MFG. CO.
Granville, Wisconsin

Gaskets, Cork
WISCONSIN GASKET & MFG. CO
Granville, Wisconsin

Gaskets, Fibrous
VELLUMOID COMPANY
Worcester, Mass.
WISCONSIN GASKET & MFG. CO.
Granville, Wisconsin

Gaskets, Metallic
THE FITZGERALD MFG. CO.
Torrington, Conn.
VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

Gaskets, Oil and Water
McCORD CORPORATION
Riopelle at E. Grand Blvd.
Detroit 11, Mich.
VELLUMOID COMPANY
Worcester, Mass.
VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.
WISCONSIN GASKET & MFG. CO.
Granville, Wisconsin

Geared Transmissions, Auxiliary
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Geared Transmissions, Unit
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gearmotors
ELLIOTT COMPANY
Jeannette, Pa.

Gears
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Aircraft Quality
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Bevel
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Cut
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Heat Treated
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Helical
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Herringbone
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Internal
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Non-Metallic
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Planetary
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Reduction
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.
DE LAVAL STEAM TURBINE CO.
Trenton 2, New Jersey
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORP.
1301 18th Avenue
Rockford, Illinois
THE SNOW-NABSTEDT GEAR CORP.
251 Welton St.
Hamden, Conn.
WORTHINGTON CORPORATION
Worthington Ave.
Harrison, N. J.

Gears, Speed Increaser
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Speed Reduction
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Spiral
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Spiral Bevel
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Spur
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Gears, Worm
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Generating Sets, Electric
See also "Diesel Generating Sets"; "Auxiliary Diesel Generating Sets"; "Emergency Diesel Generators"; "Emergency Lighting Plants".
ALLIS-CHALMERS
BUDA DIVISION
1135 S. 70 St.
Milwaukee 1, Wisc.
AMERICAN MARC INC.
1601 W. Florence Ave.
Inglewood, Calif.
MARATHON ELECTRIC MFG. CORP.
Randolph & Cherry Sts.
Wausau, Wisc.
WAUKESHA MOTOR CO.
West St. & St. Paul Ave.
Waukesha, Wisc.
WHITE DIESEL ENGINE DIV.
THE WHITE MOTOR COMPANY
Springfield, Ohio
WITTE ENGINE WORKS
OIL WELL SUPPLY DIVISION
UNITED STATES STEEL CORP.
2001 N. Lamar St.
Dallas 21, Texas

Generator, Regulator Tester
SUN ELECTRIC CORP.
Harlem & Avondale Aves.
Chicago 31, Ill.

Generators, A. C.
BRUSH ABOE, INC.
60-07 39th Ave.
Woodside, New York
COLUMBIA ELECTRIC MFG. CO.
4537 Hamilton Ave.
Cleveland 14, Ohio
ELECTRIC MACHINERY MFG. CO.
800 Central Avenue
Minneapolis 13, Minn.
ELECTROMOTIVE DIVISION
GENERAL MOTORS CORP.
La Grange, Illinois
ELLIOTT COMPANY
Jeannette, Pennsylvania
IDEAL ELECTRIC & MFG. CO.
Mansfield, Ohio
KURZ & ROOT CO., INC.
Appleton, Wisc.
THE LEECE-NEVILLE CO.
1374 E. 51 St.
Cleveland 3, Ohio
MARATHON ELECTRIC MFG. CORP.
Randolph & Cherry Sts.
Wausau, Wisc.
VENN-SEVERIN ENGINE WORKS, INC.
12822 Simms Ave.
Hawthorne, Calif.

Generators, A.C.-D.C.
KATO ENGINEERING CO.
1443 First Avenue
Mankato, Minnesota

Generators, Charging
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield, Massachusetts
THE LEECE-NEVILLE CO.
1374 E. 51st Street
Cleveland 3, Ohio

Generators, Charging, Direct Current Rectified A. C.
DELCO-REMY DIVISION
GENERAL MOTORS CORPORATION
2401 Columbus Avenue
Anderson, Indiana
LEECE-NEVILLE COMPANY
1374 E. 51st Street
Cleveland 3, Ohio

Generators, D. C.
COLUMBIA ELECTRIC MFG. CO.
4537 Hamilton Ave.
Cleveland 14, Ohio
ELECTRO-MOTIVE DIVISION
GENERAL MOTORS CORP.
La Grange, Illinois
THE ELLIOTT COMPANY
Jeannette, Pennsylvania
IDEAL ELECTRIC & MFG. CO.
Mansfield, Ohio
KURZ & ROOT CO., INC.
Appleton, Wisc.
THE LEECE-NEVILLE CO.
1374 E. 51 St.
Cleveland 3, Ohio
MARATHON ELECTRIC MFG. CORP.
Randolph & Cherry Sts.
Wausau, Wisc.

Generators, Engine Driven
ALLIS-CHALMERS MFG. CO.
BUDA DIVISION
1135 S. 70th Street
Milwaukee 1, Wis.
AMERICAN MARC INC.
1601 West Florence Ave.
Inglewood, Calif.
ELECTRIC MACHINERY MFG. CO.
800 Central Avenue
Minneapolis 13, Minn.
ELLIOTT COMPANY
Jeannette, Pa.
IDEAL ELECTRIC & MFG. CO.
Mansfield, Ohio
THE LEECE-NEVILLE CO.
1374 E. 51 St.
Cleveland 3, Ohio
LISTER-BLACKSTONE, INC.
42-32 21st St.
Long Island City 1, N. Y.
MARATHON ELECTRIC MFG. CORP.
Randolph & Cherry Sts.
Wausau, Wisc.
THE READY-POWER CO.
11231 Freud Ave.
Detroit 14, Mich.
STEWART & STEVENSON SERVICES, INC.
4516 Harrisburg
Houston, Texas
WAUKESHA MOTOR CO.
W. St. Paul Ave.
Waukesha, Wis.
WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR CO.
1401 Sheridan Ave.
Springfield, Ohio
WITTE ENGINE WORKS
OIL WELL SUPPLY DIV.
U. S. STEEL CORP.
2001 N. Lamar St.
Dallas 21, Texas

Governors, Centrifugal
FARRIS PICKERING GOVERNOR CO.
556 Commercial Avenue
Palisades Park, N. J.

Governors, Electric
WESTINGHOUSE ELECTRIC CORP.
P. O. Box 868
Pittsburgh 30, Pa.

Governors, Hydraulic
A & D DIESEL SERVICE, INC.
145 21st St.
Brooklyn 32, N. Y.
CURTISS-WRIGHT CORP.
MARQUETTE DIV.
1145 Galewood Drive
Cleveland 10, Ohio
FARRIS PICKERING GOVERNOR CO.
556 Commercial Avenue
Palisades Park, N. J.
WOODWARD GOVERNOR CO.
N. Second St.
Rockford, Illinois

Governors, Overspeed
A & D DIESEL SERVICE, INC.
145 21st St.
Brooklyn 32, N. Y.
CURTISS WRIGHT CORP.
MARQUETTE DIVISION
1145 Galewood Drive
Cleveland 10, Ohio
FARRIS PICKERING GOVERNOR CO.
556 Commercial Avenue
Palisades Park, N. J.
SYNCHRO-START PRODUCTS
8151 N. Ridgeway Ave.
Skokie, Ill.

Governors, Overspeed, Engine Shut-Off
CURTISS WRIGHT CORP.
MARQUETTE DIVISION
1145 Galewood Dr.
Cleveland 10, Ohio
FARRIS-PICKERING GOVERNOR CO.
556 Commercial Avenue
Palisades Park, N. J.
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Ave.
Skokie, Ill.

Governors, Underspeed
SYNCHRO-START PRODUCTS
8151 N. Ridgeway Ave.
Skokie, Ill.

Greases
See also "Lubricants"; "Automotive Greases".
CITIES SERVICE OIL CO.
60 Wall Tower
New York, N. Y.
NATIONAL REFINING CO.
P. O. Box 6479
Cleveland 1, Ohio
SHELL OIL CO.
50 W. 50th St.
New York 20, N. Y.
THE TEXAS COMPANY
135 E. 42d St.
New York 17, N. Y.

Grey Iron and Steel Castings
WHITE DIESEL ENGINE DIV.
THE WHITE MOTOR CO.
Springfield, Ohio

Grinders
ALBERTSON & CO., INC.
Sioux City, Iowa

Hardened & Ground Parts
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.

Heater; Coolant Pre-Heater, Electric
KIM HOTSTART MFG. CO.
917 W. Broadway
Spokane 1, Wash.

Heaters
AMERICAN AIR FILTER CO., INC.
215 Central Ave.
Louisville 8, Ky.
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
KYSOR HEATING CO.
1100 W. Wright St.
Cadillac, Mich.

Heaters, Cab & Space
YOUNG RADIATOR CO.
709 S. Marquette St.
Racine, Wisc.

Heaters, Feed Water
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.

Heat Exchangers, Air Cooled
See also, "Exchangers, Heat".
AEROFIN CORP.
101 Greenway Ave.
Syracuse 3, N. Y.
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

Heat Exchangers, Industrial
AEROFIN CORP.
101 Greenway Ave.
Syracuse 3, N. Y.
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
YOUNG RADIATOR COMPANY
709 S. Marquette St.
Racine, Wisconsin

Heat Exchangers, Oil and Water
See also headings under "Coolers"; "Exchangers, Heat"; "Water Cooling Equipment"; etc.
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
E. C. COOLEY CO.
1186 Folsom St.
San Francisco 3, Calif.
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y
HARRISON RADIATOR DIV., GM
Lockport, N. Y.
LONG MANUFACTURING DIV.
BORG-WARNER CORP.
12581 Dequindre
Detroit 12, Mich.
PERFEX CORPORATION
500 W. Oklahoma Ave.
Milwaukee 7, Wisc.
THE SIMS CO.
P. O. Box 1096
Erie, Pa.
YOUNG RADIATOR COMPANY
709 S. Marquette St.
Racine, Wisconsin

Honing Tools
HALL-TOLEDO, INC.
2931 South Ave.
Toledo 9, Ohio

Hoses, Metal, for Steam, Oil, Air
See also headings under "Flexible Metal Hose" and "Tubing".
THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIVISION
698 S. Main Street
Waterbury 20, Conn.

Hoses & Hose Assemblies, Non-Metallic
AEROQUIP CORP.
300 S. East Ave.
Jackson, Mich.
THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIV.
698 S. Main St.
Waterbury, Conn.
UNITED STATES RUBBER CO.
MECHANICAL GOODS DIV.
1230 Avenue of the Americas
New York 20, N. Y.

Hoses, Flexible Assemblies
AEROQUIP CORPORATION
300 S. East Ave.
Jackson, Mich.
THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIVISION
698 S. Main St.
Waterbury 20, Connecticut
FLEXONICS CORP.
1363 S. 3rd Ave.
Maywood, Ill.

Hoses, Flexible Metallic
See also "Flexible Metal Hose"
THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIVISION
698 S. Main Street
Waterbury 20, Conn.

Hoses, Flexible Wire Braid
AEROQUIP CORPORATION
300 South East Ave.
Jackson, Mich.
THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIVISION
698 South Main Street
Waterbury 20, Connecticut

Hydraulic Drives
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Hydraulic Fluids
CITIES SERVICE OIL CO.
60 Wall Tower
New York 5, N. Y.

Hydraulic Torque Converters
LONG MANUFACTURING DIV.
BORG-WARNER CORP.
12581 Dequindre
Detroit 12, Mich.
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.

Hydraulic Valve Lifters
EATON MANUFACTURING CO.
VALVE DIV.
9771 French Rd.
Detroit 13, Mich.

Ignition Systems, Gas Engine
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield 7, Mass.
DELCO-REMY DIVISION
GENERAL MOTORS CORPORATION
2401 Columbus Avenue
Anderson, Indiana
SCINTILLA DIVISION
BENDIX AVIATION CORPORATION
Sidney, New York

Ignition Transformers
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield 7, Mass.
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York

Impact Wrenches
ALBERTSON & CO., INC.
Sioux City, Iowa
CHICAGO-PNEUMATIC TOOL CO.
6 E. 44th St.
New York, N. Y.

INGERSOLL-RAND COMPANY
11 Broadway
New York 4, New York
SNAP-ON TOOLS CORP.
Kenosha, Wisc.

Indicators, Carbon Dioxide Portable
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Indicators, Diesel Engine
See also "Compression Testers, Diesel Engine", and other headings under "Indicators".
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.
KIENE DIESEL ACCESSORIES, INC.
10352 Pacific Ave.
Franklin Park, Illinois
KISTLER INSTRUMENT CORP.
15 Webster St.
North Tonawanda, N. Y.

Indicators, Direct Reading, Maximum Pressure
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.

Indicators, Maximum Pressure
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Indicators, Oxygen, Portable
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Indicators, Pressure-Time, Diesel Engine
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.
KISTLER INSTRUMENT CORP.
15 Webster St.
North Tonawanda, N. Y.

Indicators, Sight Flow
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Industrial Oils
See also headings under "Lubricants" and "Greases".
STANDARD OIL COMPANY (INDIANA)
910 S. Michigan Avenue
Chicago, Ill.

Industrial Wheel Tractors
INTERNATIONAL HARVESTER CO.
180 N. Michigan Ave.
Chicago 1, Ill.

Inhibitors, Water
TREANOR CORP.
4012 Truman Rd.
Kansas City 27, Mo.

Injection Equipment, High-Speed Diesel
BELL DIESEL RESEARCH
P. O. Box 842
Glendale 5, Calif.

Injection Systems, Fuel
See also "Systems, Fuel Injection".
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main St.
Springfield 7, Mass.
C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.
ROBERT BOSCH CORPORATION
268 4th Avenue
New York 10, N. Y.
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sherman Ave.
Sidney, N. Y.

Injection Systems, Service
A & D DIESEL SERVICE, INC.
145 21st St.
Brooklyn 32, N. Y.
INTERSTATE DIESEL SERVICE, INC.
2093 East 19 St.
Cleveland 15, Ohio
UNEX PRODUCTS CORP.
1841 Broadway
New York 23, N. Y.

Injector Cups and Tips
BELL DIESEL RESEARCH
P. O. Box 842
Glendale 5, Calif.

Injector Test Stand
See also "Nozzle Testers," "Test Stands".
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

In-Place Grinding Service, Large Shafts
WINONA TOOL MFG. CO.
1430 W. 6th
Winona, Minn.

Instruments, Control
MINNEAPOLIS-HONEYWELL REGULATOR CO., INDUSTRIAL DIV.
Wayne & Windrim Aves.
Philadelphia 44, Pa.

Iron Plating
See also "Plating".
VAN DER HORST CORP. OF AMERICA
1313 East State Street
Olean, New York
Terrell, Texas & Chicago, Ill.

Joints, Expansion
BADGER MANUFACTURING CO.
230 Bent St.
Cambridge, Mass.

Lapping Blocks
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.

Liners, Porous-Chrome Reclamation
VAN DER HORST CORP.
1313 East State St.
Olean, N. Y.
Terrell, Tex. & Chicago, Ill.

Lock Nuts
COLUMBIA NUT & BOLT CO., INC.
945 Main Street
Bridgeport 3, Connecticut
GREER STOP NUT CO.
2620 W. Flournoy St.
Chicago 12, Ill.

Locomotive, Heads & Blocks Repaired
SALSBURY CORPORATION
1161 E. Florence Ave.
Los Angeles 1, Calif.

Locomotives, Diesel
See also "Diesel Locomotives"
BALDWIN-LIMA-HAMILTON CORP.
North 3rd Street
Hamilton, Ohio
FAIRBANKS, MORSE & CO.
600 So. Michigan Ave.
Chicago 5, Illinois

Locomotives, Diesel-Electric
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
BALDWIN-LIMA-HAMILTON CORP.
North 3rd Street
Hamilton, Ohio
BRUSH-ABOE, INC.
60-07 39th Ave.
Woodside 77, N. Y.

Locomotives, Diesel-Mechanical
BALDWIN-LIMA-HAMILTON CORP.
North 3rd Street
Hamilton, Ohio
ELECTRO-MOTIVE DIV., G M
La Grange, Ill.

Locomotives, Diesel-Hydraulic
MAK MASCHINENBAU KIEL AKTIENGESELLSCHAFT
Kiel - Friedrichsort, Germany (Western)

Lubricants
See also "Industrial Oils", "Greases" and "Automotive Greases"
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.
SHELL OIL COMPANY
50 W. 50th Street
New York 20, N. Y.
STANDARD OIL CO. OF CALIF.
WESTERN OPERATIONS, INC.
225 Bush Street
San Francisco 20, Calif.
STANDARD OIL COMPANY (INDIANA)
910 S. Michigan Ave.
Chicago, Ill.
THE TEXAS CO.
135 East 42 St.
New York 17, N. Y.

Lubricating Compound
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Lubricating Oils
See also "Automotive Lubricating Oils";
THE CALIFORNIA OIL CO.
1200 State St.
Perth Amboy, N. J.
CITIES SERVICE OIL COMPANY
60 Wall Tower
New York, New York
NATIONAL REFINING COMPANY
P. O. Box 6479
Cleveland 1, Ohio
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.
SHELL OIL COMPANY
50 West 50th St.
New York 20, N. Y.
STANDARD OIL CO. OF CALIF.
WESTERN OPERATIONS, INC.
225 Bush St.
San Francisco 20, Calif.
STANDARD OIL CO. (INDIANA)
910 South Michigan Ave.
Chicago, Illinois

Lubricating Oil Test Kit
LENGOR, INC.
Towns-Worth Bldg.
Annapolis, Md.

Lubricators, Felt Wick
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Lubricators, Mechanical
MANZEL DIV.
HOUDAILLE INDUSTRIES, INC.
315 Babcock St.
Buffalo 10, N. Y.

MC CORD CORP.
Riopelle at E. Grand Blvd.
Detroit 11, Mich.

Machine Tools
VAN NORMAN COMPANY
3640 Main Street
Springfield 7, Mass.

Machines, Special for Engine Rebuilding Service
TOBIN-ARP MANUFACTURING CO.
6400 Penn Ave., South
Minneapolis, Minn.

Machine Tools, Precision
GREENLEE BROS. & CO.
2136 12th Street
Rockford, Ill.
VAN NORMAN AUTOMOTIVE EQUIP. CO.
3640 Main St.
Springfield 7, Mass.

Machine Tools, Precision Honing
VAN NORMAN AUTOMOTIVE EQUIP. CO.
3640 Main St.
Springfield 7, Mass.

Machinery Parts, Cracked & Broken, Repaired
METALOCK REPAIR SERVICE, INC
36-15 48th Avenue
Long Island City 1, N. Y.

Magnetos, High Tension
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield, Mass.
SCINTILLA DIVISION
BENDIX AVIATION CORPORATION
Sherman Ave.
Sidney, New York

Magnetos, Low Tension
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield, Mass.
SCINTILLA DIVISION
BENDIX AVIATION CORPORATION
Sherman Ave.
Sidney, New York

Manometers
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.

Marine Auxiliaries
MAK MASCHINENBAU KIEL AKTIENGESELLSCHAFT
Kiel - Friedrichsort, Germany (Western)

Marine Diesel Engines
MAK MASCHINENBAU KIEL AKTIENGESELLSCHAFT
Kiel - Friedrichsort, Germany (Western)

Marine Diesel, Front End Gear Driven Accessories
AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

Marine Diesel Starting Fluid
SPRAY PRODUCTS CORP.
P. O. Box 584
Camden, N. J.

Marine Reduction Gears
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Marine Reverse & Reduction Gears
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.
DELAVAL STEAM TURBINE CO.
Trenton 2, N. J.
THE SNOW-NABSTEDT GEAR CORP.
251 Welton St.
Hamden, Conn.
TWIN DISC CLUTCH CO.
1328 Racine St.
Racine, Wisc.
VENN-SEVERIN ENGINE WORKS, INC.
12822 Simms Ave.
Hawthorne, Calif.

Mechanical Lubricators
MC CORD CORP.
Riopelle at East Grand Blvd.
Detroit 11, Mich.

Metals, High Temperature & Corrosion Resistant
INTERNATIONAL NICKEL CO., INC.
67 Wall St.
New York 5, N. Y.

Meters, Elapsed Time
SIMPSON ELECTRIC CO.
5200 W. Kinzie St.
Chicago 44, Ill.

Meters, Electrical Indicating
SIMPSON ELECTRIC CO.
5200 W. Kinzie St.
Chicago 44, Ill.
SUN ELECTRIC CORP.
Harlem & Avondale Aves.
Chicago 31, Ill.

Micrometers
SNAP-ON TOOLS CORP.
Kenosha, Wisc.

Motor Generators
KATO ENGINEERING CO.
1443 First Ave.
Mankato, Minn.

Motor Generator Sets—Electro Plating, Low Voltage
MARATHON ELECTRIC MFG. CORP.
Randolph & Cherry Sts.
Wausau, Wisc.

Motor Generator Sets, High & Standard Frequencies
KURZ & ROOT CO., INC.
Appleton, Wisc.

Motors
KATO ENGINEERING CO.
1443 First Ave.
Mankato, Minn.

Motors, Electric, A. C.
ELECTRIC MACHINERY MFG. CO.
800 Central Avenue
Minneapolis 13, Minn.

Motors, Electric, A. C. & D. C.
ELECTRO-MOTIVE DIV.
GENERAL MOTORS CORP.
La Grange, Ill.
ELLIOTT COMPANY
Jeannette, Pennsylvania
THE IDEAL ELECTRIC & MFG. CO.
Mansfield, Ohio
MARATHON ELECTRIC MFG. CORP.
Randolph & Cherry Sts.
Wausau, Wisc.
WESTINGHOUSE ELECTRIC CORP.
P. O. Box 868
Pittsburgh 30, Pa.

Motors, Gear
See also, "Gearmotors".
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Mufflers, Diesel Truck
HARFLO PRODUCTS
2609 Jenkintown Rd.
P. O. Box 82
Ardsley, Pa.

Mufflers, Intake & Exhaust
See also headings under "Silencers".
AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.
BURGESS-MANNING COMPANY
742 E. Park Ave.
Libertyville, Illinois & Dallas, Tex.
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minn.
KITTELL MUFFLER & ENGINEERING CO.
915 South Santa Fe Avenue
Los Angeles, California

Mufflers, Spark Arresting
BURGESS-MANNING COMPANY
742 E. Park Ave.
Libertyville, Illinois & Dallas, Tex.
KITTELL MUFFLER & ENGINEERING CO.
915 South Santa Fe Avenue
Los Angeles, California

Nickel Alloys
INTERNATIONAL NICKEL CO., INC.
67 Wall St.
New York 5, N. Y.

Nozzle Cleaning Tools
See also, "Test Stands".
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.

Nozzles, Spray, Water-Cooled
AMERICAN BOSCH DIV.
AMERICAN BOSCH ARMA CORP.
3664 Main St.
Springfield 7, Mass.

Nozzle Testers
See also "Injector Test Stand".
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield, Massachuetts
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.
C. A. V. DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
ROBERT BOSCH CORP.
268 4th Ave.
New York 10, N. Y.

Nuts, Lock
COLUMBIA NUT & BOLT CO., INC.
945 Main Street
Bridgeport 3, Connecticut
GREER STOP NUT CO.
2620 W. Flournoy St.
Chicago 12, Ill.

Nuts, Plain & Castle

COLUMBIA NUT & BOLT CO., INC.
945 Main St.
Bridgeport 3, Conn.
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.

Oil Conditioners

See also headings under "Centrifuges"; "Conditioners".

COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
HOFFMAN-ALLEN CORP.
1400 E. Tampa
Springfield, Mo.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.
WINSLOW ENGINEERING & MFG. CO.
4069 Hollis St.
Oakland, Calif.

Oil Purification Systems, Filtering Earth Type

COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
THE HILLIARD CORP.
120 W. Fourth St.
Elmira, N. Y.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
LUBER-FINER, INC.
2514 South Grand
Los Angeles 7, California
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Oil Purification Systems Pressure and Gravity Types

COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
THE HILLIARD CORP.
120 W. 4th Street
Elmira, New York
LUBER-FINER INC.
2514 South Grand
Los Angeles 7, Calif.
WILLIAM W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.
WINSLOW ENGINEERING & MFG. CO.
4069 Hollis St.
Oakland 8, Calif.

Oil Seals & Grease Retainers

THE FITZGERALD MFG. CO.
Torrington, Conn.
VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

Oil Separators

See also "Centrifuges"

CENTRICO, INC.
75 West Forest Ave.
Englewood, N. J.
WM. W. NUGENT CO., INC.
3426 Cleveland St.
Skokie, Ill.

Oil Testing Equipment

THE GERIN CORPORATION
Avon, N. J.

Oil Systems, Pressure & Gravity

WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Oils, Diesel Fuel

See also "Fuel Oil, Diesel".

THE CALIFORNIA OIL CO.
1200 State St.
Perth Amboy, N. J.
SHELL OIL COMPANY
50 West 50th St.
New York 20, N. Y.
STANDARD OIL CO. OF CALIF.
WESTERN OPERATIONS, INC.
225 Bush St.
San Francisco 20, Calif.
STANDARD OIL CO. OF INDIANA
910 S. Michigan Ave.
Chicago, Ill.

Packing, Rod Metallic

C. LEE COOK CO.
916 South 8 St.
Louisville 3, Kentucky

Packing, Oil Wiper

G. LEE COOK CO.
916 S. 8th St.
Louisville 3, Ky.

Packing, Sheet

UNITED STATES RUBBER CO.
MECHANICAL GOODS DIV.
1230 Avenue of the Americas
New York 20, N. Y.
VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

Packing, Sheets, Oil & Water

THE DARCOID CO., INC.
145-6th Ave.
New York 13, N. Y.
VICTOR MFG. & GASKET CO.
P. O. Box 1333
Chicago 90, Ill.

Pillow Blocks, Babbitted & Bronze-Bushed Bearings

CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio
TOBIN-ARP MFG. CO.
6400 Penn Ave. S.
Minneapolis, Minn.

Pinions

BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Piping Prefabricated

ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

Piston Pin Bearings

CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio

Piston Pin Bushing Borer

GREENLEE BROS. & CO.
1236 12th St.
Rockford, Ill.
KENT-MOORE ORG., INC.
28635 Mound Rd.
Warren, Mich.

Piston Ring Removers

KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.
PERFECT CIRCLE CORP.
552 S. Washington
Hagerstown, Ind.

Piston Rings

C. LEE COOK MFG. CO.
916 South 8 St.
Louisville 3, Kentucky
DAROS AMERICAN CORP.
8128 N. Lawndale Ave.
Skokie, Ill.
DOUBLE SEAL RING COMPANY
2065 Montgomery Street
Fort Worth, Texas
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
PERFECT CIRCLE CORP.
552 S. Washington
Hagerstown, Ind.
SEALED POWER CORP.
2001 Sanford Street
Muskegon 61, Michigan
WILKENING MANUFACTURING CO.
2000 South 71 Street
Philadelphia 42, Pennsylvania

Piston Rings, Oil Control

C. LEE COOK CO.
916 South 8 St.
Louisville 3, Kentucky
DAROS AMERICAN CORP.
8128 N. Lawndale Ave.
Skokie, Illinois
DOUBLE SEAL RING COMPANY
2065 Montgomery Street
Fort Worth, Texas
KOPPERS COMPANY, INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
PERFECT CIRCLE CORP.
552 S. Washington
Hagerstown, Ind.
WILKENING MANUFACTURING CO.
2000 South 71 Street
Philadelphia 42, Pennsylvania

Piston Rings, Sealing

C. LEE COOK CO.
916 South 8 St.
Louisville 3, Kentucky
DAROS AMERICAN CORP.
8128 N. Lawndale Ave.
Skokie, Ill.
DOUBLE SEAL RING CO.
2065 Montgomery Street
Fort Worth, Texas
KOPPERS CO. INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Maryland
PERFECT CIRCLE CORP.
552 S. Washington
Hagerstown, Ind.
SEALED POWER CORPORATION
2001 Sanford Street
Muskegon 61, Michigan
WILKENING MANUFACTURING CO.
2000 S. 71st Street
Philadelphia 42, Pa.

Pistons

GILLETT & EATON, INC.
846 Doughty Street
Lake City, Minnesota
THE OHIO PISTON COMPANY
5340 Hamilton Avenue
Cleveland 14, Ohio
SEALED POWER CORPORATION
2001 Sanford Street
Muskegon 61, Michigan
UNITED ENGINE & MACHINE CO.
310 Preda St.
San Leandro, Calif.
ZOLLNER MACHINE WORKS
Fort Wayne, Indiana

Pistons, Aluminum Alloy

ALUMINUM COMPANY OF AMERICA
1501 Alcoa Bldg.
Pittsburgh 19, Pa.
BOHN ALUMINUM & BRASS CORP.
Detroit 26, Mich.

GILLETT & EATON, INC.
846 Doughty St.
Lake City, Minnesota
THE OHIO PISTON COMPANY
5340 Hamilton Avenue
Cleveland 14, Ohio
UNITED ENGINE & MACHINE CO.
310 Preda St.
San Leandro, Calif.
ZOLLNER MACHINE WORKS
Fort Wayne, Indiana

Pistons, Aluminum Alloy, Repaired
RALPH STARK, INC.
43-12 33rd St.
Long Island City 1, N. Y.

Pistons, Bi-Metallic
UNITED ENGINE & MACHINE CO.
310 Preda St.
San Leandro, Calif.
GILLETT & EATON, INC.
846 Doughty St.
Lake City, Minn.

Pistons, Cast Iron
GILLETT & EATON, INC.
846 Doughty St.
Lake City, Minnesota
THE OHIO PISTON COMPANY
5340 Hamilton Avenue
Cleveland 14, Ohio

Pistons, Heavy Duty
UNITED ENGINE AND MACHINE CO.
310 Preda Street
San Leandro, Calif.
ZOLLNER MACHINE WORKS
Fort Wayne, Indiana

Plating, Chrome
See also "Chromium."
CHROMIUM CORP. OF AMERICA
100 Park Avenue
New York 17, New York
VAN DER HORST CORP. OF AMERICA
Olean, New York
Terrell, Texas & Chicago, Ill.

Plating, Iron
VAN DER HORST CORP. OF AMERICA
Olean, New York
Terrell, Texas & Chicago, Ill.

Plating, Porous Chrome
VAN DER HORST CORP. OF AMERICA
Olean, New York
Terrell, Texas & Chicago, Ill.

Polishers
ALBERTSON & COMPANY, INC.
Sioux City, Iowa

Portable Power Units
ALCO PRODUCTS, INC.
Schnectady, N. Y.
AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.
WHITE DIESEL ENGINE DIVISION
WHITE MOTOR CO.
Springfield, Ohio
WITTE ENGINE WORKS, OIL WELL
SUPPLY DIV., U. S. STEEL CORP.
2001 N. Lamar St.
Dallas 21, Texas

Porous Chrome Plating
VAN DER HORST CORP. OF AMERICA
Olean, New York
Terrell, Texas & Chicago, Ill.

Power Plants, Automatically Controlled
CHICAGO PNEUMATIC TOOL CO.
6 East 44 St.
New York 17, N. Y.
WHITE DIESEL ENGINE DIV.
WHITE MOTOR CO.
Springfield, Ohio
WITTE ENGINE WORKS, OIL WELL
SUPPLY DIV., U. S. STEEL CORP.
2001 N. Lamar St.
Dallas 21, Texas

Power Take-Off Units
ROCKFORD CLUTCH DIVISION
BORG-WARNER CORPORATION
1301 18th Avenue
Rockford, Ill.

Power Take-Off Units, Electrical
COLE-HERSEE CO.
20 Old Colony Ave.
South Boston 27, Mass.

Power Units
See "Diesel Power Units"
AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.
HERCULES MOTOR CORP.
101 11th St., S.E.
Canton 2, Ohio
INTERNATIONAL HARVESTER CO.
180 N. Michigan Ave.
Chicago 1, Ill.
F. PERKINS (CANADA) LTD.
60 Wingold Ave.
Toronto, Ontario
WAUKESHA MOTOR COMPANY
St. Paul Ave.
Waukesha, Wisconsin
WITTE ENGINE WORKS
OIL WELL SUPPLY DIV.
U. S. STEEL CORP.
2001 N. Lamar St.
Dallas 21, Texas

Pressure Switches
DETROIT CONTROLS CORP.
5900 Trumbull Ave.
Detroit 8, Michigan
FRANK W. MURPHY MFG., INC.
Box 1476
Tulsa 1, Oklahoma
SYNCHRO-START PRODUCTS
8151 N. Ridgeway Ave.
Skokie, Ill.

Pullers, Gear, Bushing, Wheel
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

Pump Calibrating Test Stands
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pennsylvania

Pumping Units, Diesel
See also "Diesel Pumping Units".
AMERICAN MARC INC.
1601 W. Florence Ave.
Inglewood, Calif.
LISTER-BLACKSTONE, INC.
42-32 21st St.
Long Island City 1, N. Y.
NORDBERG MANUFACTURING CO.
3073 S. Chase Avenue
Milwaukee 1, Wisconsin
R. H. SHEPHERD CO., INC.
HANOVER, PA.
WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR CO.
1401 Sheridan Ave.
Springfield, Ohio

Pumps, Automatic Reversing
TUTHILL PUMP CO.
939 East 95 St.
Chicago 19, Ill.
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Centrifugal
DELAVAL STEAM TURBINE CO.
Trenton 2, N. J.
INGERSOLL-RAND CO.
11 Broadway
New York 4, N. Y.

Pumps, Cooling Water
SCHWITZER CORPORATION
1125 Massachusetts Ave.
Indianapolis, Ind.

Pumps, Fuel Oil Injection
See also "Injection Equipment", etc.
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main St.
Springfield 7, Mass.
C. A. V. DIVISION OF LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut
SCINTILLA DIV.
BENDIX AVIATION CORP.
Sidney, N. Y.

Pumps, Fuel Transfer
DELAVAL STEAM TURBINE CO.
Trenton 2, N. J.
ECLIPSE MACHINE DIV.
BENDIX AVIATION CORP.
Elmira, N. Y.
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.
GEO. D. ROPER CORP.
167 Blackhawk Park Ave.
Rockford, Ill.
TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Hydraulic
DE LAVAL STEAM TURBINE CO.
Trenton 2, N. J.
GEO. D. ROPER CORP.
167 Blackhawk Park Ave.
Rockford, Ill.

Pumps, Hydraulic Controls
DE LAVAL STEAM TURBINE CO.
Trenton 2, N. J.
TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.

Pumps, Lubricating Oil
DELAVAL STEAM TURBINE CO.
Trenton 2, N. J.
MANZEL DIV.
HOUDAILLE INDUSTRIES, INC.
315 Babcock St.
Buffalo 10, N. Y.
GEO. D. ROPER CORP.
167 Blackhawk Park Ave.
Rockford, Ill.
TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.

Pumps, Oil
DELAVAL STEAM TURBINE CO.
Trenton 2, N. J.

GEO. D. ROPER CORP.
167 Blackhawk Park Ave.
Rockford, Ill.
SCHWITZER CORP.
1125 Massachusetts Avenue
Indianapolis, Indiana
TUTHILL PUMP CO.
939 East 95th Street
Chicago 19, Illinois
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Rotary Gear Type

DE LAVAL STEAM TURBINE CO.
Trenton 2, New Jersey
GEO. D. ROPER CORP.
167 Blackhawk Park Ave.
Rockford, Ill.
TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Pumps, Rotary, Screw Type

DELAVAL STEAM TURBINE CO.
Trenton 2, N. J.

Pumps, Stripped Models

TUTHILL PUMP CO.
939 E. 95th St.
Chicago 19, Ill.
VIKING PUMP CO.
4th & Jorgensen Streets
Cedar Falls, Iowa

Purifiers, Fuel Oil

See also "Reclaimers, Oil"; and headings under "Oil."

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
WILLIAM W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois
THE SHARPLES CORP.
2300 Westmoreland St.
Philadelphia 40, Pa.

Purifiers, Industrial Oil

See Heading Above.

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
WILLIAM W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois
THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

Purifiers, Lubricating Oil

See also "Reclaimers, Oil"; and headings under "Oil."

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
THE DE LAVAL SEPARATOR CO.
The De Laval Bldg.
Poughkeepsie, N. Y.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
WILLIAM W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois
THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

Purifiers, Oil

See heading above.

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
DE LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.
THE HILLIARD CORP.
120 West Fourth St.
Elmira, New York
HOFFMAN-ALLEN CORP.
1400 E. Tampa
Springfield, Mo.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
WILLIAM W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Illinois
THE SHARPLES CORPORATION
2300 Westmoreland Street
Philadelphia 40, Pennsylvania

Push Rods

THE CHICAGO SCREW CO.
2701 Washington Blvd.
Bellwood, Ill.

Pyrometers, Exhaust

ILLINOIS TESTING LABORATORIES, INC.
420 N. LaSalle St.
Chicago 10, Ill.

Pyrometers, Portable

ILLINOIS TESTING LABORATORIES, INC.
420 N. LaSalle St.
Chicago 10, Ill.

Racks, Gear

BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Radiator Cooling System Treatment

OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Radiators, Engine Cooling

LONG MANUFACTURING DIVISION
BORG-WARNER CORP.
12501 Dequindre
Detroit 12, Michigan
MC CORD CORP.
Riopelle at E. Grand Bldg.
Detroit 11, Mich.
PERFEX CORPORATION
500 West Oklahoma Ave.
Milwaukee 7, Wisc.
YOUNG RADIATOR COMPANY
709 S. Marquette St.
Racine, Wisconsin

Rail Car Engines

AMERICAN M-A-N CORPORATION
149 Broadway
New York 6, New York
HERCULES MOTOR CORP.
101 11th St.
Canton, Ohio

Rebabbitting, Centrifugal

GOLTEN MARINE CO., INC.
455 Carroll St.
Brooklyn 15, N. Y.

Reclaimers, Oil

See also headings under "Purifiers" and "Oil."

COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
THE HILLIARD CORP.
120 West 4th St.
Elmira, N. Y.
HOFFMAN-ALLEN CORP.
1400 E. Tampa
Springfield, Mo.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Recorders, Temperature

BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.

Reducers, Speed

BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.

Regulators, Current & Voltage

See also headings under "Voltage".

DELCO-REMY DIVISION
GENERAL MOTORS CORP.
2401 Columbus Ave.
Anderson, Indiana
THE LEECE-NEVILLE CO.
1374 E. 51st Street
Cleveland 3, Ohio

Regulators, Generator Voltage

AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield, Massachusetts
ELECTRIC MACHINERY MFG. CO.
800 Central Ave.
Minneapolis 13, Minn.
THE LEECE-NEVILLE CO.
1374 E. 51 St.
Cleveland 3, Ohio

Regulators, Speed

WESTINGHOUSE ELECTRIC CORP.
P. O. Box 868
Pittsburgh 30, Pa.

Regulators, Temperature

AMOT CONTROLS CORP.
1st St. & Nevin Ave., Box 1717
Richmond 1, Calif.
DETROIT CONTROLS CORP.
5900 Trumbull Ave.
Detroit 8, Mich.
FULTON-SYLPHON DIVISION
ROBERTSHAW-FULTON CONTROLS CO.
Knoxville 4 Tennessee
THE POWERS REGULATOR CO.
3400 Oakton Street
Skokie, Illinois

Relays

SIMPSON ELECTRIC CO.
5200 W. Kinzie St.
Chicago 44, Ill.
SYNCHRO-START PRODUCTS
8151 N. Ridgeway Ave.
Skokie, Ill.

Repairs, Cold Casting

METALOCK REPAIR SERVICE, INC.
36-15 48th Avenue
Long Island City, N. Y.

Repairs, Diesel

SALSBURY CORPORATION
1161 E. Florence Ave.
Los Angeles 1, Calif.

Repair Stands, Engine

CLAYBORNE MFG. COMPANY
429 W. Main St.
Monticello, Ind.

Rust Preventives

See also "Anti-Rust Compounds"

OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.
SHELL OIL COMPANY
50 W. 50th St.
New York 20, N. Y.

Rust Removers

OAKITE PRODUCTS, INC.
22-C Rector Street
New York 6, N. Y.
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Safety Controls, Engine

See also "Controls, Engine Safety"

AMOT CONTROLS CORP.
P. O. Box 1707
Richmond 1, California
DETROIT CONTROLS CORP.
5900 Trumbull Avenue
Detroit 8, Michigan
ILLINOIS TESTING LABS., INC.
420 N. LaSalle St.
Chicago 10, Ill.
MINNEAPOLIS-HONEYWELL
REGULATOR CO.
INDUSTRIAL DIV.
Wayne & Windrim Aves.
Philadelphia 44, Pa.
FRANK W. MURPHY MFG., INC.
Box 1476
Tulsa 1, Oklahoma
PENN CONTROLS, INC.
Goshen, Indiana
VIKING INSTRUMENTS, INC.
Towne St.
East Haddam, Conn.

Schools, Diesel Mechanic

UTILITIES ENGINEERING INSTITUTE
2525 N. Sheffield Ave.
Chicago 14, Ill.

Screw Machine Products

GREER STOP NUT CO.
2620 W. Flournoy St.
Chicago 12, Ill.
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut

Screw Machine Products, Hardened & Ground

GREER STOP NUT CO.
2620 W. Flournoy St.
Chicago 12, Ill.
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Connecticut
SCHWITZER CORP.
1125 Massachusetts Ave.
Indianapolis 7, Ind.

Sealing Rings

KOPPERS COMPANY, INC.
METAL PRODUCTS DIV.
200 Scott Street
Baltimore 29, Md.
SEALED POWER CORP.
2001 Sanford St.
Muskegon, Mich.

Seals, Automatic Shaft

CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio
KOPPERS COMPANY, INC.
METAL PRODUCTS DIV.
200 Scott Street
Baltimore 29, Md.
SCHWITZER CORP.
1125 Massachusetts Ave.
Indianapolis 7, Ind.

Self-Retaining Nuts

COLUMBIA NUT & BOLT CO., INC.
945 Main St.
Bridgeport 3, Conn.

Separators

See also headings under "Centrifuges"; "Conditioners"; "Purifiers"; "Clarifiers".

CENTRICO, INC.
75 West Forest Avenue
Englewood, New Jersey
UNITED STATES RUBBER CO.
MECHANICAL GOODS DIV.
1230 Avenue of the Americas
New York 20, N. Y.

Separators, Steam

ENGINEERING CONTROLS, INC.
Paul Brown Bldg.
818 Olive St.
St. Louis 1, Mo.

Shafts, Hardened and Ground

ELLWOOD CITY FORGE CO.
Ellwood City, Pennsylvania
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.

Shock Absorbers, Rotary

HOUDAILLE INDUSTRIES, INC.
BUFFALO HYDRAULICS DIV.
537 E. Delavan Ave.
Buffalo 11, N. Y.

Shutters

KYSOR HEATER CO.
1100 W. Wright St.
Cadillac, Mich.

Signals—Pressure, Liquid Level, Temperature

ILLINOIS TESTING LABS., INC.
420 N. LaSalle St.
Chicago 10, Ill.
FRANK W. MURPHY MFG., INC.
Box 1476
Tulsa 1, Okla.
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, N. Y.
VIKING INSTRUMENTS, INC.
Towne St.
East Haddam, Conn.

Silencers, Air Filter, Intake

BURGESS-MANNING CO.
742 E. Park Ave.
Libertyville, Ill.; Dallas, Texas
VORTOX CO.
121 S. Alexander Ave.
Claremont, Cal.

Silencers, Exhaust

BURGESS-MANNING CO.
742 E. Park Ave.
Libertyville, Ill.; Dallas, Texas
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minn.
KITTELL MUFFLER & ENGINEERING CO.
915 South Santa Fe Avenue
Los Angeles, California
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Md.
MAXIM SILENCER CO.
SUBSIDIARY OF EMHART MFG. CO.
85 Homestead Ave.
Hartford, Conn.

Silencers, Intake

See heading above.

AIR MAZE CORP.
25000 Miles Rd.
Cleveland 28, Ohio
BURGESS-MANNING CO.
742 E. Park Ave.
Libertyville, Ill.; Dallas, Texas
DONALDSON COMPANY, INC.
666 Pelham Blvd.
St. Paul 14, Minn.
KITTELL MUFFLER & ENGINEERING CO.
915 South Santa Fe Avenue
Los Angeles, California
KOPPERS CO., INC.
METAL PRODUCTS DIV.
200 Scott St.
Baltimore 29, Md.
MAXIM SILENCER CO.
SUBSIDIARY OF EMHART MFG. CO.
85 Homestead Ave.
Hartford, Conn.

Solvents

See also "Cleaning Compounds"

OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Solvents, Degreasing

BRULIN & COMPANY, INC.
2939-45 Columbia Ave.
Indianapolis 7, Ind.
LUBOID COMPANY
3270 S. Third St.
Milwaukee 7, Wisc.
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Solvents for Petroleum Residues

BRULIN & CO., INC.
2939-45 Columbia Ave.
Indianapolis 7, Ind.
LUBOID COMPANY
3270 S. Third St.
Milwaukee 7, Wisc.
OCTAGON PROCESS, INC.
51 Bank St.
Staten Island 1, N. Y.

Spark Arrestors

KITTELL MUFFLER & ENGINEERING CO.
915 South Santa Fe Avenue
Los Angeles, California
MAXIM SILENCER CO.
SUBSIDIARY OF EMHART MFG. CO.
85 Homestead Ave.
Hartford, Conn.

Spark Plugs, Diesel Starting

ROBERT BOSCH CORP.
268 Fourth Ave.
New York 10 N. Y.

Special Parts
THE CHICAGO SCREW COMPANY
2701 Washington Blvd.
Bellwood, Ill.

Speed Reducers and Increasers
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.
FARRIS PICKERING GOVERNOR CO.,
556 Commercial Ave.
Palisades Park, N. J.
SNOW-NABSTEDT GEAR CORP.
251 Welton St.
Hamden, Conn.

Spray Nozzles, Fuel Injection
See also under "Nozzles"; "Valves"
AMERICAN BOSCH DIVISION
AMERICAN BOSCH ARMA CORP.
3664 Main St.
Springfield 7, Mass.
C. A. V. (Fuel Injection Equip.) DIVISION
of LUCAS ELECTRICAL SERVICES, INC.
14820 Detroit Avenue
Cleveland 7, Ohio
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sherman Ave.
Sidney, New York
UNEX PRODUCTS CORP.
1841 Broadway
New York 23, N. Y.

Spray, Starting Fluid
SPRAY PRODUCTS CORP.
P. O. Box 584
Camden N. J.

Sprockets
DIAMOND CHAIN CO.
402 Kentucky Ave.
Indianapolis 7, Ind.

Stands, Engine
BACHARACH INDUSTRIAL
INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.
CLAYBORNE MFG. CO.
429 N. Main St.
Monticello, Ind.

Starting Air Compressors, Engine Driven
See also headings under "Compressors"
BRUSH ABOE, INC.
60-07 39th Ave.
Woodside 77, N. Y.
INGERSOLL-RAND CO.
11 Broadway
New York, N. Y.
QUINCY COMPRESSOR CO.
Dept. DP
Quincy, Ill.

Starting Air Compressors, Motor Driven
See also headings above
INGERSOLL-RAND CO.
11 Broadway
New York, N. Y.
QUINCY COMPRESSOR CO.
Dept. DP
Quincy, Ill.
WORTHINGTON CORP.
Worthington Ave.
Harrison, N. J.

Starting Batteries, Storage
See also headings under "Batteries".
NIFE, INC.
Lambert Ave.
Copiague, N. Y.

Starting Fluid, Aerosol & Pint Cans
START PILOT CORP.
61 Second St.
Mineola, N. Y.

Starting Fluid, Multi-Start Aluminum Capsules
START PILOT CORP.
61 Second St.
Mineola, N. Y.

Starting Motors, Diesel Air
INGERSOLL-RAND CO.
11 Broadway
New York, N. Y.

Starting Motors, Diesel Electric
ROBERT BOSCH CORP.
268 Fourth Ave.
New York 10, N. Y.
LEECE-NEVILLE COMPANY
1374 E. 51 St.
Cleveland 3, Ohio

Steam Cleaning Equipment
CLAYTON MANUFACTURING CO.
El Monte, California
START PILOT CORP.
61 Second St.
Mineola, N. Y.

Steel Pipe Welded
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

Strainers, Oil
COMMERCIAL FILTER CORP.
2 Main St.
Melrose 76, Mass.
ELLIOTT COMPANY
Jeannette, Pa.
INDIANA COMMERCIAL FILTER CORP.
Lebanon, Ind.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Strainers, Water, Single & Duplex
ELLIOTT CO.
Jeannette, Pa.
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Supercharging Blowers
See also "Blowers, Scavenging and Supercharging"; "Turbochargers, Superchargers".
AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.
MIEHLE-DEXTER SUPERCHARGER DIV.
100 Fourth
Racine, Wisconsin
D. NAPIER & SON, LTD.
DuPont Circle Bldg.
1346 Connecticut Ave.
Washington 6, D. C.

Switchboard & Instruments
IDEAL ELECTRIC & MFG. CO.
Mansfield, Ohio

Switches, Hydraulic
COLE-HERSEE COMPANY
20 Old Colony Ave.
South Boston 27, Mass.

Switches, Manual
COLE-HERSEE COMPANY
20 Old Colony Ave.
South Boston 27, Mass.
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, N. Y.

Switches, Push Button
COLE-HERSEE COMPANY
20 Old Colony Ave.
South Boston 27, Mass.

Switches, Solenoid
COLE-HERSEE COMPANY
20 Old Colony Ave.
South Boston 27, Mass.
THE LEECE-NEVILLE CO.
1374 E. 51 St.
Cleveland 3, Ohio
SYNCHRO-START PRODUCTS, INC.
8151 N. Ridgeway Avenue
Skokie, Illinois

Switches, Starting
COLE-HERSEE COMPANY
20 Old Colony Ave.
South Boston 27, Mass.
ECLIPSE MACHINE DIV.
BENDIX AVIATION CORP.
Elmira, N. Y.
THE LEECE-NEVILLE CO.
1374 E. 51 St.
Cleveland 3, Ohio

Switchgear
ELECTRIC MACHINERY MFG. CO.
800 Central Ave.
Minneapolis 13, Minn.
IDEAL ELECTRIC & MFG. CO.
Mansfield, Ohio

Switchgear Batteries
NIFE, INC.
Lambert Ave.
Copiague, N. Y.

Synchronizers, Automatic
ELECTRIC MACHINERY MFG. CO.
800 Central Ave.
Minneapolis 13, Minn.

Systems, Fuel Injection
See also headings under "Injection"; "Fuel"; "Nozzles", etc.
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sidney, New York
UNEX PRODUCTS CORP.
1841 Broadway
New York 23, N. Y.

Tachometers, Centrifugal
ACTUATOR PRODUCTS CORP.
Main St.
West Concord, Mass.

Tachometers, Electrical
BARBOUR STOCKWELL CO.
205 Broadway
Cambridge 39, Mass.
SNAP-ON TOOLS CORP.
Kenosha, Wis.

Tachometers, Hand
ACTUATOR PRODUCTS CORP.
Main St.
West Concord, Mass.
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.

Tachometers, Mechanical
ACTUATOR PRODUCTS CORP.
Main St.
West Concord, Mass.
BARBOUR STOCKWELL CO.
205 Broadway
Cambridge 39, Mass.

Temperature Recorders
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.
ELECTRIC AUTO-LITE CO.
INDUSTRIAL THERMOMETER DIV.
1201 Champlain St.
Toledo 1, Ohio
POWERS REGULATOR CO.
3400 Oakton St.
Skokie, Ill.

Temperature Regulators, Cooling Water
See "Water Temp. Regulators"
AMOT CONTROLS CORP.
1st St. & Nevin Ave., Box 1707
Richmond 1, Calif.
THE POWERS REGULATOR CO.
3400 Oakton Street
Skokie, Illinois
ROBERTSHAW-FULTON CONTROLS CO.
FULTON SYLPHON DIV.
Knoxville 1, Tenn.

Test Kit, Lube Oil
LENGOR
Towns-Worth Bldg.
Annapolis, Md.

Test Stands, Diesel Fuel Pump
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.

Testers, Battery
SIMPSON ELECTRIC CO.
5200 W. Kinzie St.
Chicago 44, Ill.
SUN ELECTRIC CORP.
Harlem & Avondale Aves.
Chicago 31, Ill.

Testers, Nozzle
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.

Testers, Torque Wrench
P. A. STURTEVANT CO.
Addison, Illinois

Testers, Valve Spring
P. A. STURTEVANT CO.
Addison, Ill.

Testing Instruments, Electrical
SIMPSON ELECTRIC CO.
5200 W. Kinzie St.
Chicago 44, Ill.
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin
SUN ELECTRIC CORP.
Harlem & Avondale Aves.
Chicago 31, Ill.

Testing Instruments, Oil
THE GERIN CORPORATION
Avon, N. J.

Thermocouples
ILLINOIS TESTING LABORATORIES, INC.
420 N. LaSalle St.
Chicago 10, Ill.

Thermometers
See "Gages, Temperature"
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.
DIESEL PLANT SPECIALTIES CO.
Stevens Point, Wisconsin
ELECTRIC AUTO-LITE CO.
INDUSTRIAL THERMOMETER DIV.
1201 Champlain St.
Toledo 1, Ohio
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Thermometers, Dial Indicating
ELECTRIC AUTO-LITE CO.
INDUSTRIAL THERMOMETER DIV.
1201 Champlain St.
Toledo 1, Ohio
ILLINOIS TESTING LABS., INC.
420 N. LaSalle St.
Chicago 10, Ill.
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York
SIMPSON ELECTRIC CO.
5200 W. Kinzie St.
Chicago 44, Ill.

Thermometers, Dial Indicating, Distance Type
ELECTRIC AUTO-LITE CO
INDUSTRIAL THERMOMETER DIV.
1201 Champlain St.
Toledo 1, Ohio
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Thermometers, Flue Gas
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pa.
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, N. Y.

Thermometers, Indicating
ILLINOIS TESTING LABS., INC.
420 N. La Salle Street
Chicago 10, Ill.
ROCHESTER MFG. CO., INC.
Rockwood St.
Rochester 10, New York

Thermometers, Portable Recording
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.
THE ELECTRIC AUTO-LITE CO.
INDUSTRIAL THERMOMETER DIV.
1201 Champlain St.
Toledo 1, Ohio

Timing Chains
DIAMOND CHAIN CO., INC.
402 Kentucky Ave.
Indianapolis 7, Ind.

Tools, Diesel Engine Service
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Avenue
Pittsburgh 8, Pa.
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd., Warren, Mich.
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

Tools, Mechanic's Hand
SNAP-ON TOOLS CORP.
Kenosha, Wis.

Torque Converters
CLARK EQUIPMENT CO.
Buchanan & Jackson, Mich.

Torque Converter Transmission Combinations
LONG MFG. DIV.
BORG-WARNER CORP.
12581 Dequindre
Detroit 12, Mich.

Transmissions
BRAD FOOTE GEAR WORKS
1315 S. Cicero Ave.
Cicero 50, Ill.
CLARK EQUIPMENT CO.
Buchanan & Jackson, Mich.

Transmissions, Reversing
SNOW-NABSTEDT GEAR CORP.
251 Welton St.
Hamden, Conn.

Transmissions, Torque Converter Combinations
LONG MFG. DIV.
BORG-WARNER CORP.
12581 Dequindre
Detroit 12, Mich.

Truck Cab Air Conditioners
KYSOR HEATER CO.
1100 W. Wright St.
Cadillac, Mich.

Tubing, Corrugated, Flexible Metallic
See also headings under "Flexible" and "Hose".
THE AMERICAN BRASS CO.
AMERICAN METAL HOSE DIVISION
698 S. Main Street
Waterbury 20, Conn.

Tubing, Flexible Metal
See heading above.
THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIVISION
698 S. Main Street
Waterbury 20, Conn.

Tubing, Flexible, Non-Metallic
THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIV.
698 S. Main St.
Waterbury 20, Conn.
UNITED STATES RUBBER CO.
MECHANICAL GOODS DIV.
1230 Avenue of the Americas
New York 20, N. Y.

Tubing, High Pressure
THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIV.
698 S. Main St.
Waterbury 20, Conn.

Turbochargers
AIRESEARCH INDUSTRIAL DIV.
GARRETT CORP.
9225 Aviation Blvd.
Los Angeles 45, Calif.

Turbochargers, Superchargers
See also headings under "Blowers"; "Supercharging Blowers".
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
BROWN BOVERI CORPORATION
19 Rector Street
New York 6, New York
DR. ALFRED J. BUCHI
U. S. ENGINEERING REP.
ERNEST G. HUBER
1018 Munsey Bldg.
Washington 4, D. C.
DE LAVAL STEAM TURBINE CO.
Trenton 2, N. J.

ELLIOTT COMPANY
Jeannette, Penna.
MIEHLE-DEXTER SUPERCHARGER DIV.
100 Fourth
Racine, Wisc.
D. NAPIER & SON, LTD.
DuPont Circle Bldg.
1346 Connecticut Ave., N.W.
Washington 6, D. C.
SCHWITZER CORP.
1125 Massachusetts Avenue
Indianapolis 7, Indiana

Unit Fuel Injector Repair
INTERSTATE DIESEL SERVICE, INC.
2093 East 19 St.
Cleveland 15, Ohio

Unit Injectors, Fuel Oil
AMERICAN BOSCH DIV.
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield 7, Mass.
SCINTILLA DIVISION
BENDIX AVIATION CORP.
Sherman Ave.
Sidney, New York

Valve Facing Machines
ALBERTSON & CO., INC.
Sioux City, Iowa

Valve Guides
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.

Valve Plates, Non-Metallic
C. LEE COOK CO.
916 S. 8th St.
Louisville 3, Ky.

Valve Regrinders
HALL-TOLEDO, INC.
2931 South Ave.
Toledo 9, Ohio
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin
VAN NORMAN AUTOMOTIVE EQUIPMENT COMPANY
3640 Main Street
Springfield 7, Mass.

Valve Seat Grinders
HALL-TOLEDO, INC.
2931 South Ave.
Toledo 9, Ohio

Valve Seat Inserts
EATON MANUFACTURING CO.
VALVE DIV.
9771 French Rd.
Detroit 13, Mich.
HALL-TOLEDO, INC.
2931 South Ave.
Toledo 9, Ohio

Valve Tappets
THE CHICAGO SCREW COMPANY
2701 Washington Blvd.
Bellwood, Ill.
EATON MANUFACTURING CO.
VALVE DIV.
9771 French Rd.
Detroit 13, Mich.

Valves, Engine
EATON MANUFACTURING CO.
VALVE DIV.
9771 French Rd.
Detroit 13, Mich.

Valves, Engine Indicator
BACHARACH INDUSTRIAL INSTRUMENT CO.
7301 Penn Ave.
Pittsburgh 8, Pa.
KIENE DIESEL ACCESSORIES INC.
10352 Pacific Ave.
Franklin Park, Illinois

Valves, Sight-Feed
WM. W. NUGENT & CO., INC.
3426 Cleveland St.
Skokie, Ill.

Valves, Thermostatic
AMOT CONTROLS CORP.
1st St. & Nevin Ave., P. O. Box 1707
Richmond, Calif.
THE POWERS REGULATOR COMPANY
3400 Oakton Street
Skokie, Illinois

Valves, Three-Way
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
THE POWERS REGULATOR CO.
3400 Oakton St.
Skokie, Ill.

Variable Speed Drives
BACHARACH INDUSTRIAL INSTRUMENT COMPANY
7301 Penn Avenue
Pittsburgh 8, Pennsylvania

Variable Speed Transmissions
LOVEJOY FLEXIBLE COUPLING CO.
4866 W. Lake St.
Chicago 44, Ill.

Vessels, Pressure
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.
AMERICAN M-A-N CORP.
149 Broadway
New York 6, N. Y.

Vibration Control
HOUDAILLE INDUSTRIES, INC.
BUFFALO HYDRAULICS DIV.
537 East Delavan Ave.
Buffalo 11, N. Y.

Vibration Eliminators
THE AMERICAN BRASS COMPANY
AMERICAN METAL HOSE DIVISION
698 South Main Street
Waterbury 20, Connecticut
ATLANTIC METAL HOSE CO., INC.
309 Dyckman Street
New York 34, New York

Viscosity Indicating Devices
THE GERIN CORPORATION
Avon, New Jersey

Voltage Controls
COLE-HERSEE COMPANY
20 O'd Colony Ave.
South Boston 27, Mass.

Voltage Regulators
BROWN BOVERI CORPORATION
19 Rector Street
New York 6, N. Y.
THE LEECE-NEVILLE CO.
1374 E. 51 St.
Cleveland 3, Ohio

Volt-Ammeters, Clamp-on Type
COLUMBIA ELECTRIC MFG. CO.
4537 Hamilton Ave.
Cleveland 14, Ohio

Volt-Ohm-Milliammeter
SIMPSON ELECTRIC CO.
5200 W. Kinzie St.
Chicago 44, Ill.

Washers
CLEVELAND GRAPHITE BRONZE CO.
DIV. OF CLEVITE CORP.
17000 St. Clair Ave.
Cleveland 10, Ohio
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.

Waste Heat Boilers
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.

Water Cooling Equipment
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.
YOUNG RADIATOR COMPANY
709 Marquette St.
Racine, Wisconsin

Water Heaters, Waste Heat
DAVIS ENGINEERING CORP.
30 Rockefeller Plaza
New York 20, N. Y.

Water Separators & Filters, Mechanical
De LAVAL SEPARATOR CO.
25 Columbia St.
Poughkeepsie, N. Y.

Water Softeners
R. M. HOLLINGSHEAD CORP.
840 Cooper St.
Camden 2, N. J.

Water Temperature Regulators
AMOT CONTROLS CORP.
P. O. Box 1707
Richmond 1, Calif.

Water Treatment
TREANOR CORP.
4012 Truman Rd.
Kansas City 27, Mo.

Welding, Diesel Parts
RALPH STARK, INC.
43-12 3rd St.
Long Island City 1, N. Y.

Windshield Wipers, Electric
AMERICAN BOSCH DIV.
AMERICAN BOSCH ARMA CORP.
3664 Main Street
Springfield 7, Mass.

Weldments
ALCO PRODUCTS, INC.
30 Church St.
New York 8, N. Y.

Worm Gears
BRAD FOOTE GEAR WORKS
1315 So. Cicero Avenue
Cicero 50, Illinois

Wrenches
See also "Tools".
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

Wrenches, Box, Open End
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

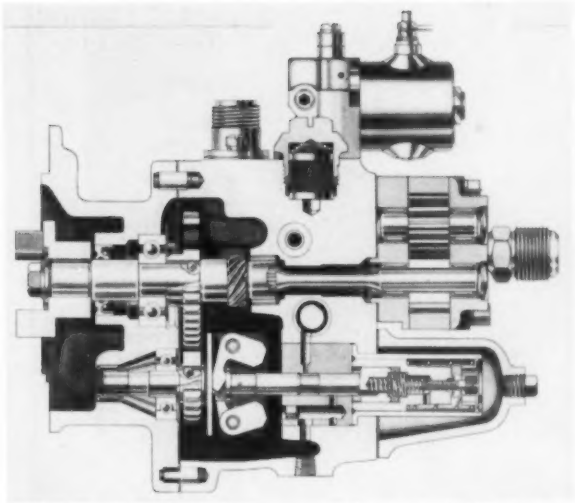
Wrenches, Socket
HARTFORD MACHINE SCREW CO.
Box 1440
Hartford 2, Conn.
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin

Wrenches, Torque
KENT-MOORE ORGANIZATION INC.
28635 Mound Rd.
Warren, Mich.
SNAP-ON TOOLS CORP.
Kenosha, Wisconsin
P. A. STURTEVANT COMPANY
Addison, Illinois

Wrist Pin Bushing Boring Fixtures
KENT-MOORE ORGANIZATION, INC.
28635 Mound Rd.
Warren, Mich.

Pick the Right Governor for the Job

What do you want the engine to do? When you know this you can get a governor to give the right response. Here are some of the different governors available and ideas on how and where they're used.



Limiting speed mechanical governor supplied as a standard on Cummins automotive, industrial and marine engines controls idling and maximum speeds. Throttle gives operator control between these speeds.

DIFFERENT jobs demand different governor characteristics. For this reason, engine manufacturers make available various types of governors—each suited for a specific job. Here's a rundown on governors with different characteristics and how and where one manufacturer applies them to his engine.

Governor Types

Basically the function of all governors is the same—to control the quantity of fuel injected to match the engine load requirements. However how a governor does this varies with the job the engine does. The regulating-type governors used for this purpose can be sub-divided into three types—variable speed, constant speed and limiting speed. Combinations of these types are even used when necessary to match properly fuel quantity to load. An example is the use of a tailshaft governor in series with a variable speed governor in a torque converter application.

The variable speed-type governor gives full governor control over the entire speed range of the engine. This for example would be desirable in locomotive or marine use. The constant speed governor is used where speed can't be permitted to vary, such as in generator sets. A limiting speed governor, commonly found in automotive use, is for overspeed protection and idling control, yet permits the mid-speed or operating range to be manually controlled without assistance from the governor.

Each of these types can also be classified according to how it reacts to changes in speed and how it changes the fuel injection pump setting to correlate fuel quantity to load. For example, the variable speed and limiting speed governors can be of the conventional mechanical or centrifugal flyweight type or hydraulic type. The constant speed governor can be of the centrifugal flyweight, hydraulic or the new electric type. (See DIESEL POWER, April 1956)

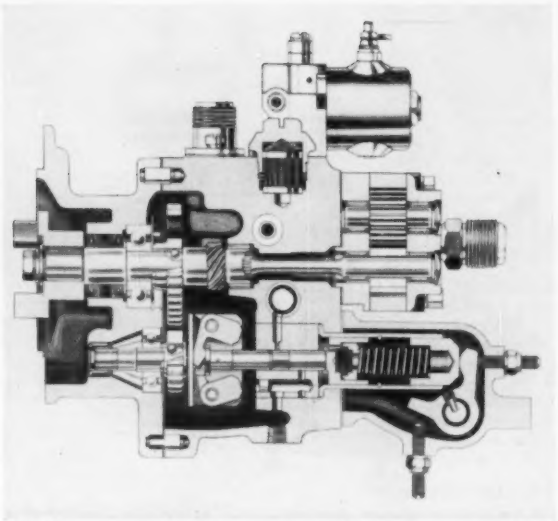
To match fuel delivery to load, the flyweight and hydraulic types both depend on centrifugal flyweights sensitive to changes in engine speed. A variation of these governors, the overspeed type, acts as a safety device to prevent engine damage from overspeed should the engine governor fail. Some actually stop the engine by cutting off fuel or air at dangerous speeds and must be reset before restarting engine.

The electric governor is sensitive to load changes and actually anticipates engine speed changes, giving very rapid governor response. This is desirable in generating closely-regulated power with engine-generator sets. In small, well-designed, high-speed engine-generator sets, this rapid response has produced typical maximum transient speed deviations of less than 1.5%.

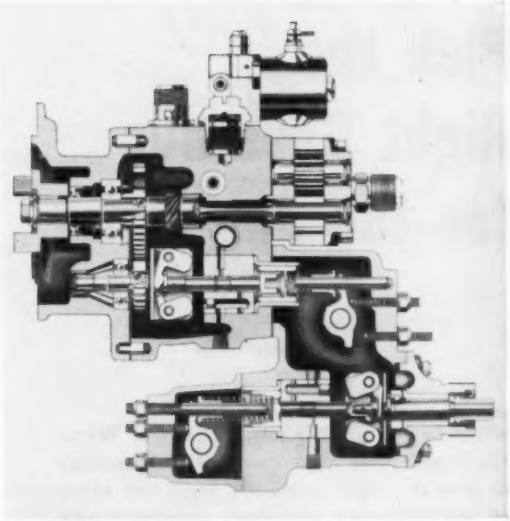
For examples of where and how different conventional flyweight and hydraulic governors are used, here's a rundown on their application to one specific manufacturer's engines — Cummins.

Mechanical Limiting Speed Governor

The standard governor supplied on automotive, industrial, and marine Cummins diesels is of the flyweight type and performs two functions. First, the governor maintains sufficient fuel for idling when the throttle is in idle position and second, it restricts fuel flow and controls engine speed at a pre-determined maximum rpm. Between idling and maximum speed, the throttle gives the operator full control of the engine.



Variable speed mechanical governor furnished on Cummins diesels for road graders, cranes and similar equipment. Also used on constant speed generators and pumps. Operator has infinite selection of governed speeds between idling and maximum speeds by throttle.



Tailshaft governor is variable-speed type connected in series with Cummins engine variable speed governor. It limits speed of torque converter shaft under variable-load conditions. It is driven by a cable from the torque converter shaft.

The illustration shows how outward force of the flyweights moves the horizontal governor shaft to the right as engine speed is increased. The rate of movement is determined by the idling and high speed spring combinations shown at the extreme right. Various springs are available to give different governed speeds for engines used in different applications. Idling speeds are adjustable by means of the screw at the extreme right which changes the compression on the idling spring.

Variable Speed Mechanical Governor

The variable speed mechanical governor shown is designed to meet the requirements of machinery in which the engine must operate at different speeds as determined by the operator, and also of machinery which must operate at constant speed. Examples of the first condition are road graders, cranes, and similar equipment where propulsion and power take-off drives require different engine rotative speeds. Examples of the second condition are pumps and generators.

This governor has a speed variation between no-load and full-load of 8%. Where closer regulation is required —as with generator units operating in parallel—a hydraulic governor is recommended.

Changes in idling speed and maximum speed can be accomplished by adjustment of the idle speed and maximum speed screws. This adjustment changes the travel of the throttle. Between these stop positions, the operator has an infinite selection of governed speeds by varying the position of the governor control lever.

As with the limiting speed governor, the horizontal governor shaft restricts the fuel flow to the cylinders at idling and at governed speeds. However, in the variable speed governor, the speeds at which this restriction of fuel flow occurs is controlled by the operator.

Torque Converter Governor

Even when load on a torque converter varies, constant output shaft speed is demanded in some applications. For this reason a tailshaft governor is needed which senses variations in output shaft speed rather than engine speed. (See DIESEL POWER June 1957)

The tailshaft governor furnished by Cummins is designed to limit the speed of the torque converter shaft under variable load conditions. It is a separate variable speed governor connected in series to the engine variable speed governor. At the predetermined maximum shaft speed, this governor restricts fuel flow to the engine.

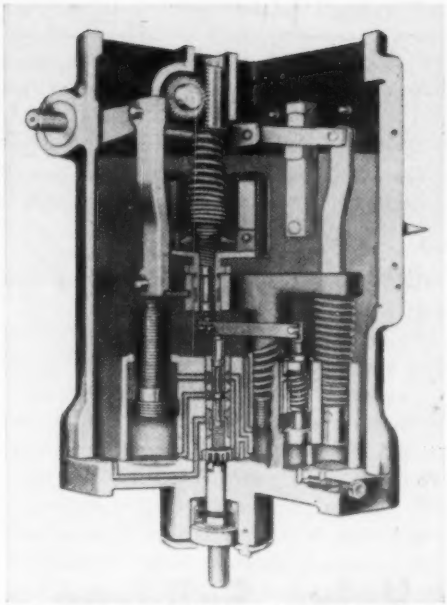
Movement of the engine throttle gives the operator control of maximum engine speeds in the same manner as with the variable speed mechanical governor. This governor also acts as an overspeed and idling speed governor while the torque converter governor has control in the intermediate range.

Adjusting screws seen in the illustration permit different speed settings of both the torque converter shaft speed and the engine rpm. The auxiliary governor is driven by a cable from the torque converter shaft, while the engine governor is gear driven from the engine's timing gears.

When load is applied to the converter, the output shaft tends to slow down. The governor immediately directs more fuel to the engine increasing the horsepower delivered. When load is removed, the governor reduces fuel to the engine and reduces power output. This action maintains a constant shaft speed under variable load conditions as required for shovels, drilling rigs, and other torque converter equipped-machines.

Hydraulic Governor

A hydraulic governor uses lubricating oil to actuate the governor mechanism and gives closer regulation than



Hydraulic governor furnished by Cummins is adjustable for either variable- or constant-speed operation. It uses lube oil to actuate governor mechanism giving closer regulation than mechanical type.

is available with mechanical-type governors. The hydraulic governors used by Cummins are adjustable for either variable speed or constant-speed operation. They can be used for the same type variable-speed applications as the mechanical variable speed governor where a minimum variation between "full-load" and "high-idle" speeds is desirable. A simple adjustment on the governor allows this speed regulation to be varied.

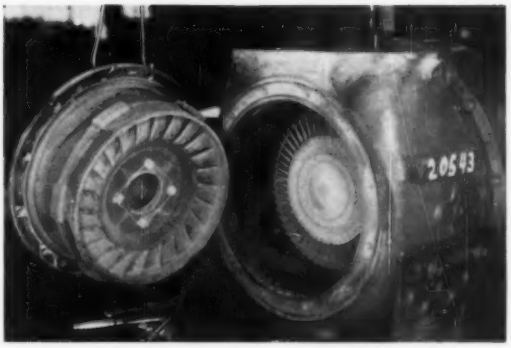
The hydraulic governor also is available for constant-speed applications. Because of the adjustable regulation, this governor is considered best for units operating in parallel, such as generator sets. This feature allows two or more units to be kept in synchronization and balance.

A special hydraulic governor also is available which gives zero speed variation between full-load and no-load speeds. This allows Cummins diesels to be used for applications such as radio and television station generators in which a constant electrical frequency must be maintained.

A simple load-balancing valve has been designed by Cummins to equalize fuel pressure of two or more engines driving a common shaft and may be used with any of the governors described here.

Conclusion

Since each of the governor types discussed is for a specific application, it's essential that the correct one be selected to match engine operating characteristics to load requirements. Work with the engine manufacturer and/or the governor manufacturer for proper selection and application of governors. If you're involved in governor installations, follow the recommendations of the engine or governor manufacturers.



Turbos Are Rugged

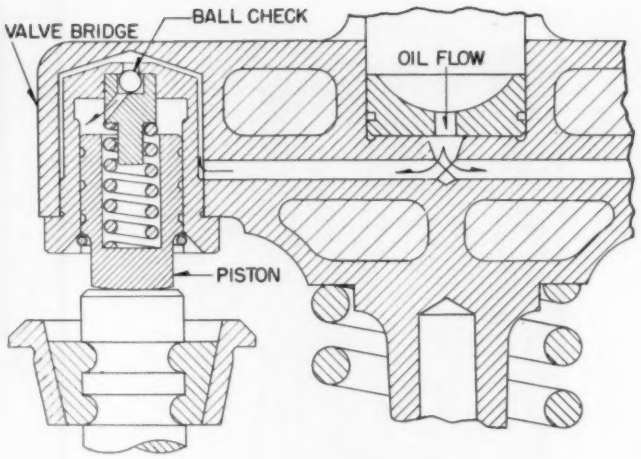
TURBOCHARGERS are not delicate. Here's a case where even after 35,000 hours of practically continuous operation two Elliott turbochargers were still in very good running condition.

Thorough inspection of the completely disassembled turbobchargers showed that rotor journals, thrust faces and bearings had little or no wear. Nozzles and rotor blades alone showed signs of slight erosion. This was attributed to good engine design and operation. Good combustion of the Ingersoll-Rand gas engine compressor on which they are used and fine filtering of the intake air before entering the blowers really payed off.

The condition of the bearings indicated that the lube oil also had been well filtered and maintained in proper condition.

The IR gas-engine compressor involved was installed in the Michigan-Wisconsin Pipe Line Company's compressor station at Havensville, Kansas, several years ago and has been in service practically 24 hours a day ever since. While it was shutdown for overhaul in December 1956, its two turbochargers were returned to the Elliott Company's Jeannette plant for inspection.

Lash adjuster is press fitted into end of valve bridge. Lube oil is seen flowing through drilled passage in valve bridge, around top of lash adjuster, past ball check and into the cylinder of the lash adjuster.



Field service has proven that a rigid maintenance program for hydraulic lash adjusters greatly reduces engine failures caused by valve blows and broken valves. Here's how they work, how to maintain them—and how . . . .

Lash Adjuster Care Cuts Valve Failures

WHEN lash adjusters are faulty, control of valve action is erratic. Seating velocity is usually too high and the valves are subjected to high seating inpact. This is one common cause of valve failure resulting in engine downtime.

Faulty adjusters and high seating impact result in noise. This is one telltale of impending valve failure. By replacing noisy lash adjusters, at least one large Western railroad the Santa Fe has cut engine failures resulting from valve blows and broken valves by 60%. Let's see how the lash adjusters on this railroad's EMD diesels operate and how they're serviced.

The hydraulic lash adjuster consists of a body (a cylinder) with a hollow plunger. This plunger accommodates a small spring and follower, the top of which acts as a retainer for a ball check that seats at the bottom of an oil supply hole in top of the body. These parts are held in assembly by a snap ring retainer. An entire assembly is pressed into each end of the valve bridge which operates the two exhaust valves on an EMD unit.

Lube oil flows from the rocker arm through a drilled passage in the valve bridge to the top of the lash adjuster, past the ball check into the body. When the rocker arm depresses the valve bridge, a slight movement of the plunger in the lash adjuster seats the ball check and traps the oil. Since oil is practically incompressible, further movement of the rocker arm causes the lash adjuster plungers to force open the exhaust valves.

The trapped oil provides the cushioning effect necessary for maintaining zero lash between the valve stem and the rocker arm bridge provided all associated parts are working properly. Pressure exerted by the valve spring through the valve stem against the lash adjuster plunger maintains pressure within the body and holds the ball check closed. Thus the oil provides the force to retard violent action of valve closing.

Since the ball check is closed during valve opening and closing, pressure exerted by the rocker arm and valve spring against the plunger will be high enough to force a little trapped oil through the small clearance between plunger and body. This leakage permits plunger movement and gives the lash adjuster its automatic adjustment ability to maintain zero lash. But this leakage can also cause disastrous results if not controlled by proper adjustment and maintenance.

Inspection

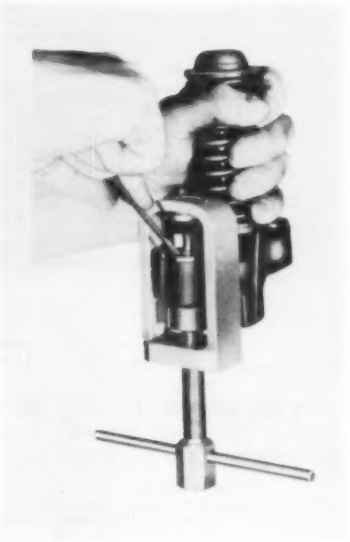
Persistent clicking of lash adjusters calls for immediate inspection and action necessary to eliminate improper conditions. Adjusters may be noisy for a brief period after starting an engine, particularly when cold, until pressure is built up and warm oil flows through them.

Lash adjusters should always be inspected and tested whenever cylinder heads are removed or adjusters are removed from the valve bridge. By use of special tools such as the lash adjuster compressor, and plug and snap ring remover shown, internal parts of the lash adjuster may be removed for cleaning or replacement without removal from the valve bridge.

Dirt in the lash adjuster causes lube oil to leak past the ball check. This condition can be tested by depressing the plunger by hand. If the plunger can be depressed

rapidly with lash adjuster full of oil, the ball check is leaking. To correct this condition, disassemble the adjuster and clean all parts thoroughly. A gummy deposit on the plunger can be cleaned by using alcohol or lacquer thinner.

After reassembling and recharging with lube oil, if testing still shows leakage past ball check or plunger, check further for wear and possible replacement of worn parts.



Plug at top, inside of lash adjuster compressor, forces piston down compressing spring to remove snap ring with special tool in hand. Compressor without plug is used to press adjuster into valve bridge.

Removing, Testing and Replacing Worn Parts

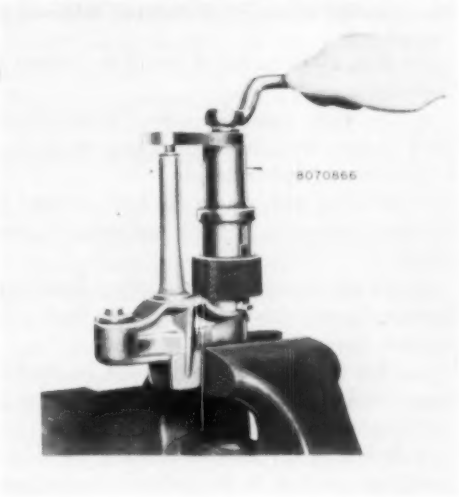
Remove lash adjuster from bridge by clamping valve bridge in a vise and using the special tool shown. To install lash adjuster in bridge, also use a special tool.

Another way of testing lash adjusters after removal from the valve bridge is by using a special pair of pliers developed by Santa Fe shop personnel. A loop on one jaw of these pliers holds the lash adjuster while the opposite jaw of pliers lines up with the plunger. While held in these pliers, a lash adjuster is immersed in SAE 10 oil and pumped full of oil while depressing the ball check at the same time with a suitable pointed tool. With ball check released and lash adjuster removed from oil, it should be almost non-compressible. A worn lash adjuster will be easily compressed.

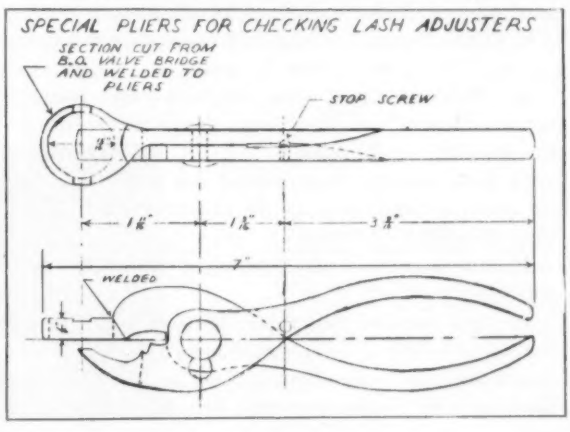
Special tool No. 8070866 is used to remove lash adjuster from the valve bridge seen clamped in vise.

Wear of lash adjuster body is generally on one side only. Since plunger is free to rotate it does not wear out of round. A new lash adjuster plunger and body used on EMD engines are machined and ground to fit with almost 0.001-in. clearance.

A new adjuster plunger for this unit is 0.624-in. in diameter, and a worn plunger less than 0.6235-in. in diameter is discarded. A ring gauge 5/16-in. thick finished to a diameter of 0.6235-in. is used to check worn plungers. Any plunger fitting through this ring gauge is too small for further service. A new lash adjuster body is finished to 0.625-in. and any body worn to more than 0.6255-in. is discarded. This wear is checked by a "T" gauge, with the top of "T" 0.6255-in. in length.



Loop on one jaw of pliers holds lash adjuster while opposite jaw lines up with plunger. While held in pliers, it is immersed in oil and pumped full. Worn lash adjuster is easily compressed.

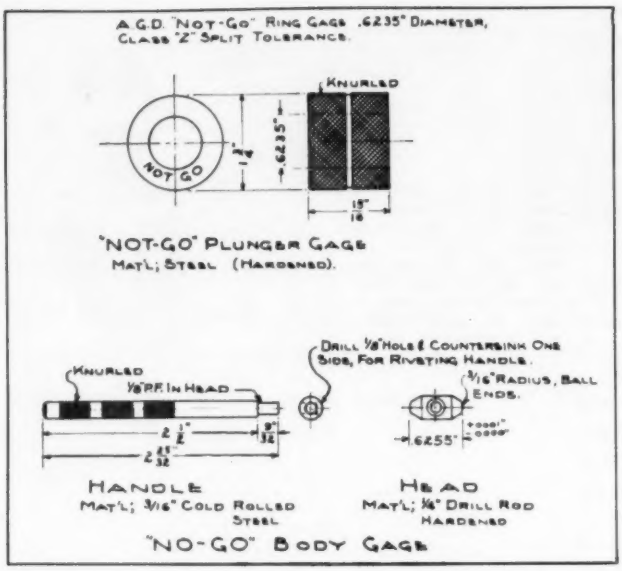


Results of Maintenance Program

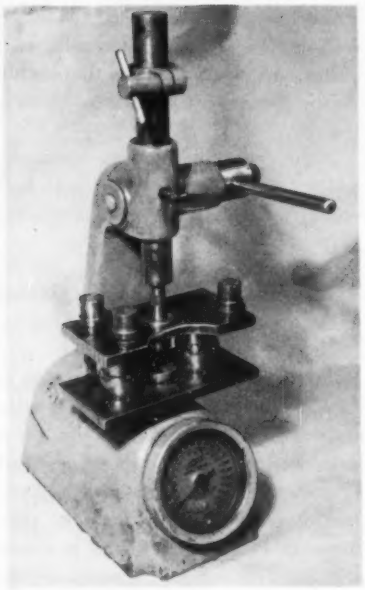
At the last annual meeting of The Locomotive Maintenance Officers' Assoc., the chairman, a representative of the Santa Fe, stated that on his railroad, a program to overhaul and replace worn lash adjusters had reduced engine failures due to broken valves and valve blows by more than 60%. Very few broken valves are now found in their engines which have the lashes reconditioned or renewed.

This program for inspecting and reconditioning lash adjusters was actually a part of an intensive program to recondition cylinder heads, valves and associated parts. Here's brief review of this program as presented in an L.M.O.A. committee report a year previously. It included attention to parts of the head and valve assembly and listed the following specific instructions.

1. Valve seats in cylinder heads are to be ground to a perfect seat, perpendicular to valve stem guide, and not



Plungers fitting through 0.6235-in. diameter ring gauge are discarded. Cylinders are discarded if 0.6255-in. "T" gauge fits through bore. Gauges are used by Santa Fe to check EMD 567 engine Lash adjusters.



Lash adjuster spring tester used by Union Pacific railroad shop checks spring tension.

more than 0.001-in. out of round as checked with a dial indicator.

2. Any valve stem guides worn to 0.6332-in. ID measured ½ inch from the bottom and top of the guide are to be removed and replaced.

3. All valve stem guides are to be reamed to 0.629-in. ID after application to heads and prior to grinding valve seats.

4. All new or reconditioned valves must be thoroughly inspected, preferably by the Zyglo method, and any questionable ones rejected.

5. After grinding, all valves must be checked in a fixture with a dial indicator to insure that valve face is concentric with valve stem.

6. Valves as well as seats in heads are to be held to dimensions specified in the builder's engine manual.

7. Valve spring seat locks must be carefully mated with the valve stem and the valve spring seat.

8. The fit of the two halves of the lock with the valve stem grooves should receive careful attention.

9. The lock assembly must lock tight when the spring seat is held in place against the locks.

10. When rotating a valve stem with finger pressure, no movement of individual parts should occur—the entire assembly should rotate.

11. Each assembly thus checked and mated should be set aside for application to the same valve and spring when installed in the head.

12. Minimum dimension from top of the lock to top of long valve stem is 9/32-in.

13. After reconditioning valves and valve seats, the difference in height of valve stems under the same bridge should not vary more than 1/32-in. as determined by checking with a valve stem tram. Grinding end of valve stem to come within this tolerance is not permissible.

14. All valve and valve bridge springs must be checked for a free length, 4-1/8-in.

15. Valve bridge spherical seats are to be inspected and any defective seat renewed.

After complete cylinder head assembly has been installed, the lash adjusters must be properly set when the piston is at or near TDC. Depress valve bridge with a bar to release oil from lash adjuster cylinder so that the spring will be the only pressure against plunger. Then after loosening locknuts, turn adjusting screw until lash adjuster contacts the lower valve stem.

Use a 0.002-in. feeler gauge between top of valve stem and adjuster plunger to determine contact, then tighten rocker adjusting screw 1½ turns. In the case of a short-travel lash adjuster follow the same procedure, except tighten adjusting screw only ½ turn after plunger contacts the 0.002-in. feeler gauge.

After running engine a few minutes, the clearance between lash adjuster bodies and end of valve stems should be checked with piston near TDC. If the clearance is less than the 1/16-in. thickness of a gauge which fits around lash adjuster plunger, some defective condition exists in one or more parts of the assembly. In such a case the head should be removed for further reconditioning or rejection.

Conclusion

A program for inspecting and reconditioning of worn lash adjusters should be properly set up and strictly followed by all responsible for their operation. If this is done, valve failures due to chipped or broken valves, valve stem failures, worn lock grooves and worn keepers can be greatly reduced.

BUSES THAT BEND

Here's new twist in highway super travel-diesel buses that angle around corners.

DIESEL powered 60-ft articulated buses are the latest addition to Continental Trailways' luxury fleet. These German-built buses with accordian-type pleats between the two sections, will operate between Denver and Pueblo, Colo., on the famed "Pikes Peak scenic route".

The accordian pleats in the mid-section permit the bus to bend as it rounds a corner. A turntable apparatus whips the second section around a corner in the tracks of the rear wheels of the first unit. The driver only has to watch the first unit.

The Academy Express, as it is called, has an inside turning radius of less than 40 ft whereas a conventional bus of 35 ft has an inside turning radius of some 60 ft. It has 10 wheels and the front axle steers like a conventional bus while the rear axle of the trailing unit also steers and tracks the turning point of the turntable between the two units.

These 64 passenger coaches offer the usual extras of the company's other luxury buses—pretty hostesses in striking red uniforms similar to those of airline hostesses; recorded music; a snack bar; free magazines and pillows; carpets and rest rooms.

The refreshment bar, hostess seat and other passenger serving facilities are located in the center section, while the rest room is in the rear of the trailing unit. Individual reading lights are conveniently located on the back of each seat, as are ash trays. Extra touches are an illuminated clock, altimeter and inside temperature gauge, all visible to the passengers.

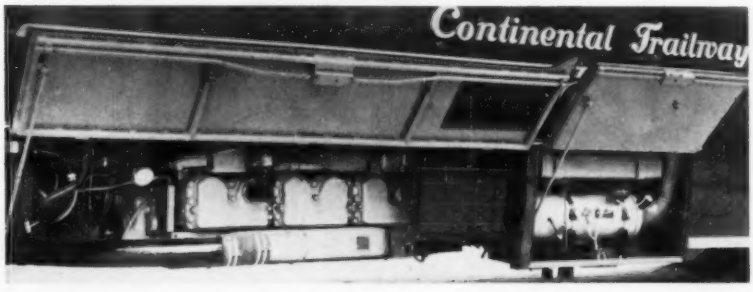
Part of the roof section of the $47,000 bus is tinted glass which permits exceptional sightseeing opportunities. There are two doors, one forward and the second about the center of the coach.

Powered with an American-built Cummins horizontal diesel engine, the Academy Express coach is constructed of high tensile steel and aluminum. It is exceptionally light, weighing about the same as a typical 40-ft bus.

While bigger, these fancy vehicles aren't as lavish as Transcontinental's Golden Eagle, a $43,000 bus built by the same firm, Kassbohrer Co. of Ulm, West Germany. Some 50 of these buses powered with MAN diesels will be spread over their far-flung lines later this year. The only one now operating is running between Houston and Dallas.

The Golden Eagle is said to be the first regularly scheduled bus in this country to offer a complete observation lounge. This lounge will seat nine persons in comfort. It has 3 tons of air-conditioning despite a great expanse of glass. The 41-passenger coach is fitted with a stainless steel snack bar, coffee-maker, food-warmer and the essentials for light refreshment service. A smartly appointed rest room adjoins the lounge. Passengers have a completely unobstructed view from the "eye-level" ride. It is reported to have the largest forward viewing area of any coach ever built.

The idea behind use of these luxury buses, of course, is to draw more passengers from other types of transportation, particularly the private auto. In recent years, for instance, bus companies have faced declining revenues as more Americans took to their cars for touring and commuting.



Cummins Model NH Series 6-cyl, 4-cycle, turbocharged pancake diesel engine powers this Academy Express bus. The diesel develops 300 hp at 2100 rpm and has 5½-in. bore and 6-in. stroke.

ADS Grows and Grows and Grows

COME next November, the Association of Diesel Specialists will be one year old. That's not remarkable in itself but take a look at what has happened in its 7-month life.

Last November, representatives of 13 shops engaged in sales and service of fuel injection equipment and governors attended the first meeting. At the February, 1957, meeting, membership was up to 39 shops. At their June meeting in St. Louis, membership was up to 50 shops and 95 people attended.

During this period the Association has been incorporated, By-Laws adopted, and an Association emblem accepted. You'll be seeing this emblem in many of the better shops all over the country pretty soon.

What makes men like Henry Stairs, Stairs Bros. Reg'd., Frederickton, New Brunswick, Canada, travel all that way to attend these meetings? And others from all over this country? There's a simple answer—the Association is filling a need.

Watch the note-taking at the technical sessions and listen to the shop talk that goes on far into the night. Plus all the ideas that are passed on, such important committees as the ones on Standards and Service Information will soon start turning out bulletins. Other member services are also planned.

Various manufacturers are cooperating closely with the group. Take one panel session. American Bosch, RoosaMaster, Robert Bosch, Bendix-Scintilla, Demco, Woodward Governor and Pierce Governor were represented. Panel members caught all the questions from the floor and threw some back. Result—everyone learned something.

This was the first of these meetings at which there were exhibitors. Ten manufacturers of injection equipment, governors, test equipment, tools and specialty items showed their wares.

What does all this mean to the engine user? He'll get a better job for his money. ADS members can draw on the composite knowhow of shops all across the country. Jobs will be done better and faster and at attractive prices.

There's another meeting coming up. This one is set for the Jung Hotel in New Orleans on October 18-19. If you are interested drop S. E. Franklin, ADS secretary, a line at Diesel Control Corp., Wilmington, Calif.

OUT WITH THE OLD

BACK in 1925, few foresaw that this box-like diesel-electric locomotive—the first in U. S. rail history—would run the steamer almost into oblivion. But just that happened in the 32 years she's faithfully shunted freight cars in Jersey Central's Bronx Terminal Yard.

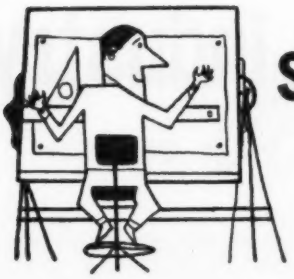
American Locomotive Co. designed the body of this now historic No. 1000 and General Electric furnished her controls and generator. Ingersoll-Rand manufactured her in-line, vertical 4-cycle, 6-cyl engine. The veteran diesel developed a then-surprising 300-hp at 600 rpm—delivering one horsepower for every 60 lb of weight.

Other diesels at that time averaged only 250 rpm and weights of 175 to 250 lb per horsepower. So No. 1000's engine heralded the now-realized trend toward more horsepower with less weight.

Despite her small size—less than half the length of the present 66-ft road-switcher, she is cumbersome compared with the sleek modern numbers.

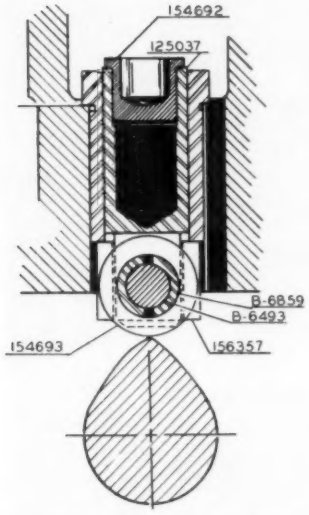
Well, Old 1000 has made her last run. She will rest now in the B & O Transportation Museum in Baltimore. Her duty done, she'll leave today's increased loads to the much more powerful models like this Alco 2400-hp DL-600.

ON WITH THE NEW



service section

Recent engine and equipment modifications, procedures and recommendations straight from the different manufacturers to you



Waukesha's Field Conversion To Roller-Type Tappets

When Waukesha Engine Models 6 WAK, 6WARD, 6WAKB, and 6WAKR have their tappets converted to roller-types, the following must be understood before attempting a change in the field.

1. A new camshaft is required because of the difference in valve operating characteristics. Valve action points must be remarked on the flywheels.

2. Crankcase must be drilled and tapped at six locations for tappet retaining clamps. A slight counterbore must be machined at each tappet location to provide a true seating surface for the 154694 tappet guide shoulders.

3. This requires a suitable precision jig to locate the drilling for the tappet clamp screws and a piloted counterbore cutter with an accurately located stop collar. These tools are available at cost from authorized Waukesha distributors.

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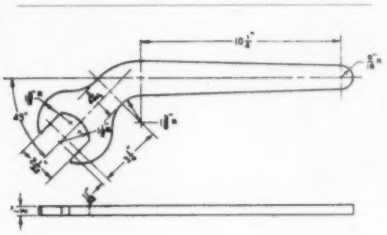


Fan Belt Tension Lock-Nut Wrench

Reports from the field indicates the need for an offset wrench for tightening or loosening the fan belt tension lock-nut on the Cummins engines that are used in the International Harvester 65 and 95 Payhaulers. This is necessary due to the location of the nut.

To properly use this tool it is necessary to turn the wrench over after each stroke to permit clearance for it to fit on the nut for another stroke.

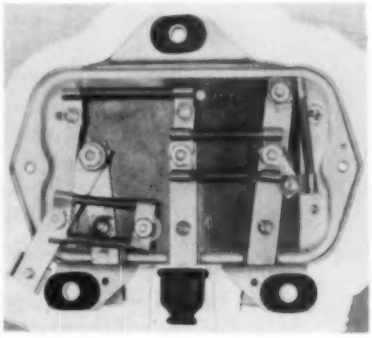
These wrenches are not available however they may be made as shown.

Draining Oil and Water from Cummins Horizontal Engines

The pockets formed by the cam boxes on HHR and NHH engines are often overlooked during water or oil drain operations. Water can enter the cam boxes only during a head or liner change, but unless removed it will cause dilution of lube oil. It is also important to remove dirty oil from cam boxes during an oil change.

Use a long piece of tubing attached to an air jet to blow the water or oil out of each cam box when you

(*Continued on Page* 111)



Replacing 24-V Generator On Cat

Whenever you remove a generator from the machine, or disconnect the leads, the generator must be repolarized to make sure it has the same polarity as the battery is is to charge.

To do this on 24-v direct electric starting systems, install the generator on the machine and connect all leads properly. Then remove the wire from the regulator "field" terminal and touch it momentarily to the terminal on the regulator marked "battery". Reconnect the wire to the "field" terminal and the job is done.

Don't ever attempt polarizing by placing a "jumper" between the regulator terminals "F" and "B" or "F"

(*Continued on Page* 111)

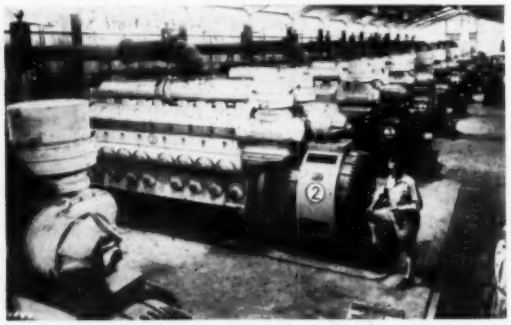
news of our industry

Slush Pump Doubles as Blowout Protection

Iran Oil Co. will install this National Supply G-1000 slush pump with three-section drive group including three-torque converter equipped diesels. Besides normal uses in drilling, it will give protection in case of blowout of a well. Just that happened in 1956. More than 80,000 bbl a day spread over the countryside before the well could be controlled.

The pump has a maximum input of 1000 hp at 65 strokes per min. Power plant is mounted with it on special 12-in. steel beam sub-base. Equipment includes National Type "B" drive group and three Superior PTD-6 diesels with National A-295 torque converters.

Equipment will be set up about 100 yd from the drilling rig and will have separate mud pits. Discharge flow line will be connected to well head. Thus the pump can be used to kill or control a well if necessary.



GM Belgian Congo Power Plant

Lined up here are 12 General Motors portable power generating plants, each with 1000-kw capacity. They help meet the power demand for increased copper ore production at Union Miniere Mines in Panda, Belgian Congo. Power units were readily transported by railway flat-car from a West African port to the site and quickly installed.

Airborne Sales and Service

Super service and sales by seaplane is the latest feature introduced by George Engine Co., GM Distributor for marine, industrial and oil field diesels.

Newly acquired Model 180 Cessna really speeds up customer coverage, says Sales Manager Herb Colby. This stepped-up service is welcomed by users of Detroit Diesels and EMD oil well drilling power packages. By the way, George Engine is one of only four factory sales and service representatives for these Electro-Motive units.

Piloting the plane is Charlie Lopez who doubles in brass as GEC sales engineer. When the weather is right, he goes by air to drilling locations and shipyards in the Gulf States. He ferries other sales and service personnel and light cargos of parts.

On return trips to New Orleans, the pontoon-equipped Cessna lands on the Intracoastal Canal and taxis to the ramp right in back of George Engine's main offices and shops. Super service—mission accomplished!

new products . . . . . Page 96

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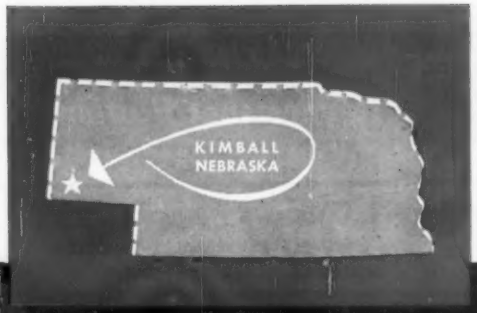
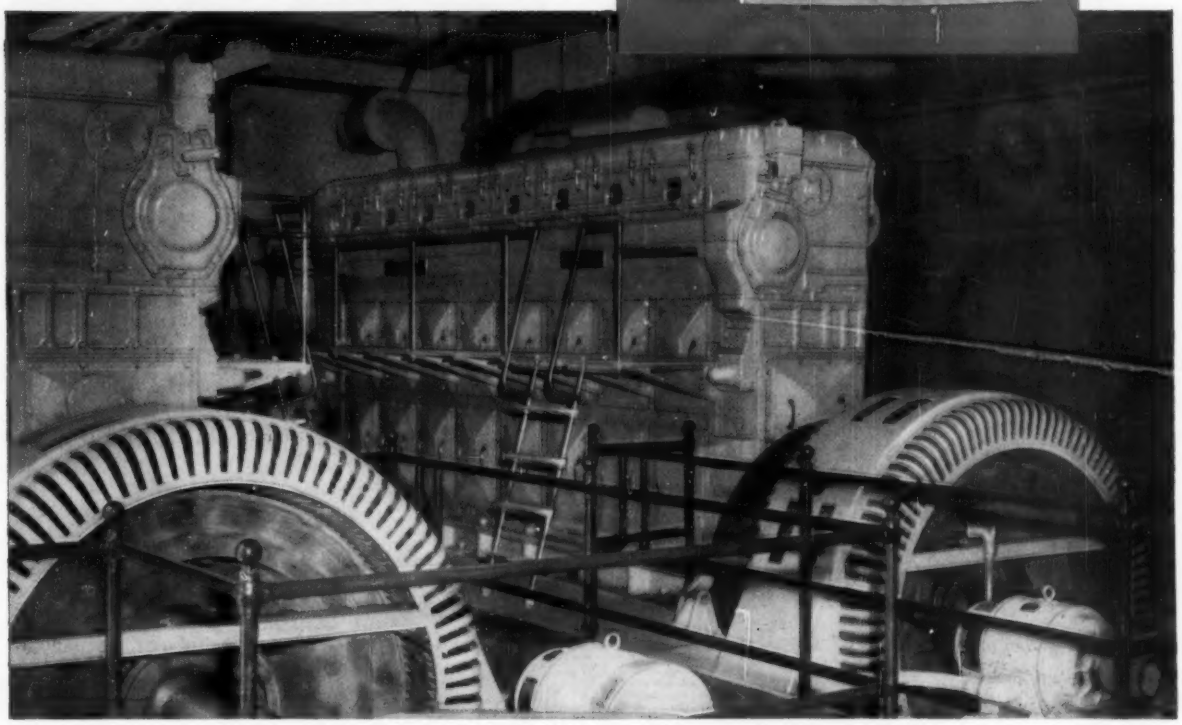
Kimball's power plant saves $58,000 yearly!





powered by . . .

SUPERIOR DUAL-FUEL ENGINES

Six years ago, fast-growing Kimball, Nebraska decided to modernize its inadequate power plant. Today, powered by three Superior Dual-Fuel Engines, Kimball's power plant is saving $58,000 a year over private utility rates. The engines operate with natural gas at an average cost of 6.93 mills per KWH. On diesel fuel alone power costs are 10 mills per KWH, and annual savings would be $35,000.

The first engine paid for itself in savings in less than three years! Repeat orders later demonstrated the confidence of Kimball city fathers in Superior engine quality. As a further bonus, the three engines are expected to give good service for 35 to 40 years, according to the town's Public Works Director.

Such *savings, satisfaction* and long-term *service* are characteristic of White's Superior engines. See how you can participate in "Kimball-type" savings. Call or write the nearest office listed below. Let White's engineers discuss the new features of Superior and Atlas engines, ranging from 100 to 2150 H.P., for power to 1500 KW.

White Diesel

WHITE DIESEL ENGINE DIVISION

THE WHITE MOTOR COMPANY Plant and General Offices: Springfield, Ohio

SALES AND SERVICE POINTS: Ketchikan, Alaska • San Francisco, Terminal Island, California • Denver, Colorado • Washington, D. C. • Clearwater, Florida • New Orleans, Louisiana • Boston, Mass. • Park Rapids, Minnesota • Webster Groves, Missouri • Callaway, Nebraska • New York, New York • Portland, Astoria, Oregon • Ft. Worth, Houston, Texas • Seattle, Wash. • Halifax, Nova Scotia • Vancouver, B. C.

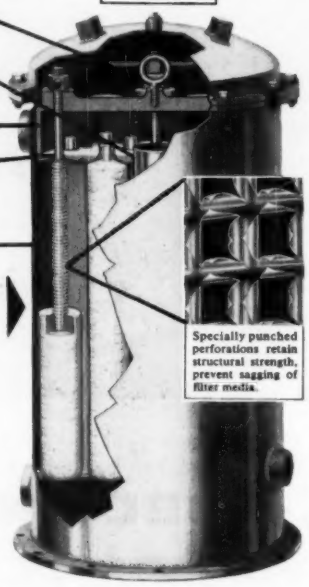
THE PROBLEM: "Heavy duty filtration to your specification"

THE ANSWER "ENGINE LIFE Maxiflo '4000' SERIES OF FULLY ENCASED, MULTIPLE FILTER SYSTEMS!"

Replaceable Element Filtration For Marine, Diesel and Natural Gas Engines In:

HEAVY INDUSTRY (Pipelines & Power Plants)
CONSTRUCTION (Heavy Earth-Moving Equipment)
MARINE ENGINES
STATIONARY ENGINES

"4000" SERIES



- Elements uniformly compressed with wing-nut bolts. This reduces service cost factor.
- Neoprene "O" Ring Seal insures perfect seal, eliminates gasket replacement.
- Cast aluminum manifold for ideal element compression.
- Piston type bypass valves do not orifice when open, valves face downward so abrasives will not adhere to piston and be flushed back into engine.
- Heavy welded steel construction.

Maxiflo non-corrosive metal cores handle up to ten times normal running volume, give solid vertical support.

MODERN FUEL CONDITIONING THROUGH "4000" FULL FLOW SYSTEMS

- Condition viscous lube oil and fuel.
- Remove, neutralize acid without using chemicals.
- Trap abrasives: carbon, dust, metal particles.
- Meet today's supercharged engine requirements.
- Give maximum oil flow, minimum pressure loss.
- Repel moisture on element surface.

Maxiflo "3000" SERIES *Ratio-rated for:*
OIL DRILLING RIG ENGINES • PUMPING ENGINES • TRUCKS • MARINE ENGINES (light) • CONSTRUCTION (Euclid trucks, shovels, etc.)

For moderately heavy duty installations, the Maxiflo "3000" Series offer the same consistent performance as the "4000" Series.

FOR BOTH *Maxiflo* "4000" AND "3000" COMPLETE DIMENSION DRAWINGS AND SPECIFICATIONS FURNISHED ON REQUEST

A Comprehensive Line of Filters and Replacement Elements

ENGINE LIFE *PRODUCTS CORPORATION*
EL MONTE, CALIFORNIA

news of our industry

Diesel Grinds Out Cattle Feed

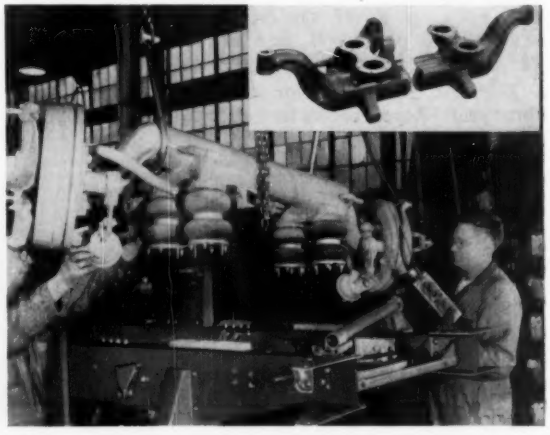
Addition to the checkerboard fleet of portable feed mills operated by Ralston-Purina dealer organization is this diesel-powered Sedbury unit recently introduced in the Chattanooga, Tenn., area.

Weekly job of the new machine is to grind feed for 400 dairy and beef cattle on a 200-acre farm in Brainerd. The unit, powered by a 4-cyl Detroit Diesel engine, processes a mixture of grain, hay and concentrate at the rate of about one ton per hour.

Some Truck Drivers Ride on Air

Thanks to a hollow axle able to withstand 16 times more twisting force than a conventional axle, truck drivers can now literally ride on air. The tubular axle contains compressed air for operating the front assembly of GMC's unique truck air suspension system in which air bellows take the place of regular leaf springs. When the truck hits a bump, the air in the bellows contracts, cushioning the impact. Beam-like air reservoirs perform the same function in the rear of the vehicle.

Here workers lower a hollow axle onto a truck frame. Upside down at this stage, the chassis is turned over later for further assembly operations. Insert shows cutaway view of axle featured in ten basic air-ride truck models in production at GMC.



news of our industry

Bus Riders Get Break

To regain lost traffic, buses throughout the nation are beginning to spruce up. In Philadelphia, they're perfuming exhausts. St. Louis added air conditioning to 100 buses at the cost of $300,000. Chicago bus riders can watch TV while they sip coffee en route to work via bus. Cleveland guarantees a seat for a 12-mile express run to the city's center.

All this super-service is needed now to woo back lost customers. But foresight would have been better to keep riders happy right along. Now comes this hindsight in improving service and equipment.

Busy Future for Cummins

"Business Week" predicts big business for Cummins Engines. Domestic orders alone, spurred by roadbuilding, assure them of big markets ahead—first in construction equipment, then in trucks which will ply the new thruways. Cummins currently power half of all diesel trucks sold.

Besides the rosy domestic front, they are building in Scotland the first U. S. diesel plant in the United Kingdom. This will boost overseas business. A surprising 18.5% of all their sales are export. They look to up this to 30% five years from now.

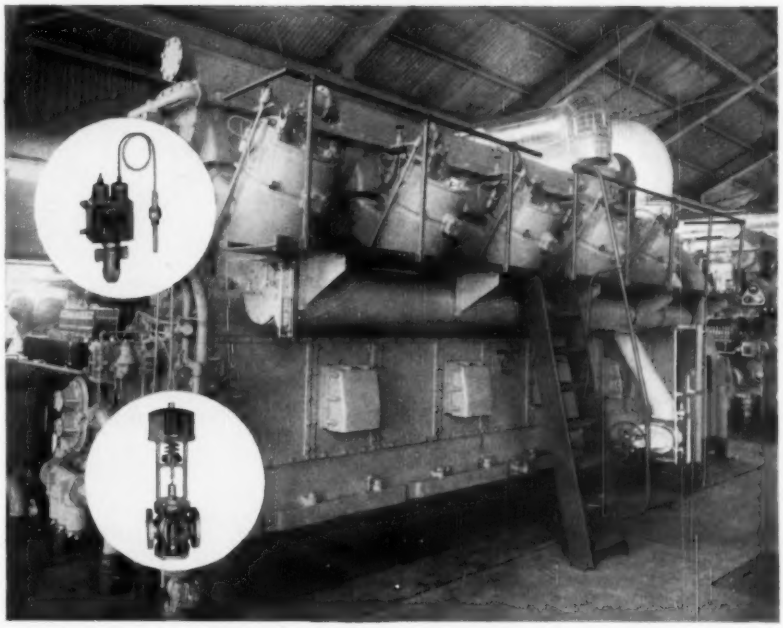
Facts About Oil Increases

Much has been said and written about increases in prices of crude oil and petroleum products. American Petroleum Institute neatly reviews the subject in their bulletin "The Facts About Oil Prices".

Here are a few of the highlights. There have been only two crude oil price advances at the production level in nine years. Other industries have raised prices every year or more often. Oil earns a lower rate on capital invested than many other commodities. Labor and production costs have risen much faster than crude oil prices. And it takes more money these days to produce enough oil—$6.1 billion in 1956 compared with $2.0 billion in 1946.

(*Continued on Page* 106)

This safety control combination provides maximum SHUT-OFF PROTECTION



Photograph courtesy Cooper-Bessemer Corporation

PROBLEM: To provide the maximum possible shut-off protection against any eventuality for heavy-duty compressors such as this 1350 h.p. unit.

FULTON SYLPHON SOLUTION: With its wide experience in controls for engines and compressors Fulton Sylphon recommended a combination of No. 530 Safety Control and No. 953-E Pressure Operated Valve—both typical soundly engineered products.

RESULT: The No. 530 Safety Control protects the engine three ways —against high jacket water temperature or low lube oil pressure and overspeed. In either case the No. 530 operates the No. 953-E to give bubble-tight shut-off of gas supply and vent the engine's fuel system —voiding any possibility of later damage from accidental ignition. Even in case of accidental injury to the thermal element, the control will trip to shutdown position.

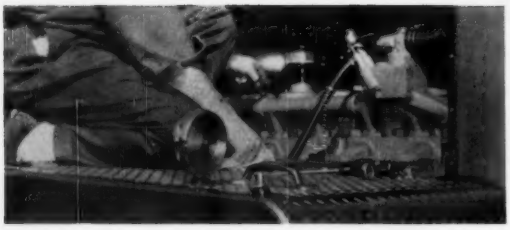
This combination of Fulton Sylphon Safety Controls is relied upon by leading producers of compressors and stationary engines. Investigate them for your engines—send for BULLETIN 817-ND

Mr. Controls

Robertshaw-Fulton CONTROLS COMPANY

FULTON SYLPHON DIVISION • Knoxville 1, Tenn.

new products



Heavy-Duty, Big Load Reo Diesels

For big load operations or rugged off-highway jobs, Reo Motors has introduced Series B diesel trucks and tractors. Models include seven highway trucks, three off-highway trucks and six tractors. The units are powered by a choice of nine Cummins diesels with horsepower ranging from 175 to 335.

Four- or six-wheel chassis are available in either steel or lightweight versions incorporating many weight-reducing aluminum or magnesium components.

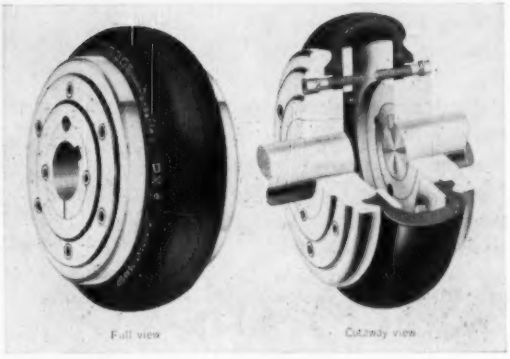
All models feature slant-back windshield for full-sweep vision and dual headlights for more seeing distance. "Catwalk" fenders have diamond safety treads so driver or mechanic can easily reach the engine.

Flexibility of cab and chassis construction, plus a wide range of available options, make these units quite versatile for on and off-highway jobs.

Lift Trucks Go Diesel

Diesel engines are now the power behind lift trucks such as the YC-40 Hyster 4000-lb capacity unit you see here. They are equipped with Waukesha Model 180 DLC 4-cyl engines rated at 46 hp at 2400 rpm. These Hyster lift trucks have solid-cushioned tires and are available with 3000-, 4000- and 5000-lb capacity.

Lower fuel consumption, long engine life and increased tractive effort are just three reasons why Hyster uses diesels for these lift trucks.



Flexible Coupling Features Rubber Tire

Para-flex, a new flexible cushion coupling, is announced by the Dodge Mfg. Corp. Adapted from a West German design, heart of the coupling is a tire with synthetic tension members bonded together in rubber.

Ability to handle angular mis-alignment, parallel mis-alignment and end-float—in any combination —is one of the advantages claimed for the coupling. The flexible member also cushions shock loads and diminishes torsional vibration, thus protecting both driver and driven machine.

The coupling consists of a flexible tire clamped between two hubs which are mounted on the shafts to be coupled. The flexible member is held between flanges and clamp rings of the hubs. Both hubs are machined to take Taper-Lock bushings. These give the equivalent of a shrunk-on fit on the shaft and permit quick application to shafts of different diameters without costly reboring.

The tire has a transverse split molded into it, which permits easy installation without disturbing coupling or alignment of shaft. To make a change, just the cap screws must be loosened enough to remove the tire.

According to Dodge engineers, Para-flex will take angular mis-alignment up to 4°, parallel mis-alignment up to ⅛ in., and end-float up to 5/16 in.—contingent upon size of the coupling and the duration of the conditions — or it will take all of these simultaneously.

Because there is no metal-to-metal contact in the Paraflex coupling, it requires no lubrication, Dodge concludes. They are now available in capacities up to 600 hp at 900 rpm.

THERE'S NO SUBSTITUTE for LUBER-FINER'S ENGINEERED PROTECTION

YES! IT'S WHAT'S **INSIDE** THAT COUNTS

The Efficiency of Luber-finer's Exclusive Patented Process HAS NEVER BEEN EQUALLED!

USE ONLY GENUINE Luber-finer DIESELPAKS

Only a Luber-finer Unit *Plus* a Genuine Luber-finer Pack can give the Exclusive Patented Filtering Process that has made Luber-finer The Standard of The Industry Since 1936!!

THERE'S A LUBER-FINER MODEL FOR EVERY TYPE OF ENGINE— EVERY TYPE OF OIL!!

LUBER-FINER PACKS AVAILABLE

1. REFINING PACK

Introduced to the public in 1935 for use with straight mineral oils, fuel oils, hydraulic oils, and inhibited industrial oils.

2. DIESELPAK

First made available in 1941, the DIESELPAK was primarily designed for use with H.D. detergent compounded oils and has also achieved outstanding results when used with fuel oils and straight mineral oils.

DON'T BE MISLED BY PRICE ALONE!

There is no substitute for DIESELPAK'S Patented Filtering Process for H.D. Compounded oils AT ANY PRICE!

The DIESELPAK cleans more oil faster —keeps it CLEAN longer—and gives more service and better engineered protection than ANY of the substitute filtering elements being offered for Luber-finer units.

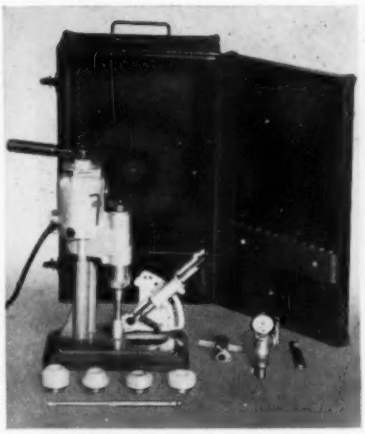
IT PAYS TO GET THE BEST!

STANDARD OF THE INDUSTRY SINCE 1936

Luber-finer Units are Standard and Optional Equipment on America's Leading Diesel Trucks, Tractors, Stationary Engines.

Write for Complete Information to Dept. 53

LUBER-FINER, INC.
2514 S. Grand Ave., Los Angeles 7



Eccentric Valve Grinder

Kent-Moore announces availability of an eccentric valve seat grinder for Detroit Diesel engines. Similar in principle to the well-known Waterbury-Hall design, the grinder is sold under the new number J-816S, replacing KMO 167D. The eccentric grinder works on all diesel engines when used with the proper pilots and grinding wheels. Kent-Moore says it is built so a service shop can achieve the same precision finish job as at factory level.

Utilizing the point-contact grinding principle, they claim it grinds valve seats without waste. More seats can be ground per wheel with less frequent stone dressing because of the micrometer feed. The maker adds it gives greater accuracy, less wheel breakage and constant action than does the hand feed stop-and-start method. A valve seat dial gauge, accurate to 0.001 in., is included for checking seat wear and finish grind.

Also announced by Kent-Moore is a new adapter set with proper pilot and wheels for use on Detroit Diesel new 4-valve head Series 71 engines.

Sealing Compound Stays Soft

Thread sealing compound, Rectorseal No. 4, which dries slow and sets soft has been perfected by Rector Well Equipment Co. Extended field tests by the firm show it is suitable for piping connections carrying air, natural gas, propane, butane, crude oil and fuel oil.

For more details, just fill in the card inserted in this issue.

New OAKITE HURRICLEAN STEAM GUN

removes heavy soil in half the time!

If you had designed this new "HURRICLEAN" Steam-Detergent Gun yourself — if you had planned it, part by part, to enable you to steam-clean more thoroughly, quickly, easily, at lower cost, you couldn't have suggested one practical advantage that isn't incorporated in the "HURRICLEAN" gun.

Check these big advantages:

- ✓ Works off plant steam supply — no tanks, pumps or injectors needed.
- ✓ No more burns — cold solution travels along outer tube. Keeps grip surface cool.
- ✓ No more hose twisting — to change direction of cleaning spray, merely turn rubber grip on its rotary joint.
- ✓ Lightweight — gun weighs only 6 1/4 pounds.

To get a close-up of this new gun in action, to see how easily it works, how safe it is, how well it cleans, see your nearby Oakite man for a *free*, practical demonstration. Send for illustrated brochure. Oakite Products, Inc., 22C Rector Street, New York 6, N. Y.

OAKITE

Export Division Cable Address: Oakite

Technical Service Representatives in Principal Cities of Canada

PENDLETON
TOOL INDUSTRIES
INC.
Under this banner
the Proto Tool Company
will continue to serve
the needs of all industries
Founded in 1907, PROTO is the World's largest producer today of high-quality hand service tools. Leadership is attributable mainly to the professional quality of PROTO tools—resulting from intensive research, field-tested designs, special alloy steels, and superior manufacturing.
PROTO means PROfessional TOols!
PROTO TOOLS
PROTO means PROfessional TOols
DIVISION OF
50 YEARS
1907-1957
2209 SANTA FE AVE.
LOS ANGELES, CALIF.
583 ALLEN STREET
JAMESTOWN, NEW YORK

new products

Self-Cleaning Filter

For use with coolants or lube oils, Bowser, Inc. has introduced a fully automatic filter with interchangeable elements.

The filter media for lubricating oil filtration is made of wire-wound stainless steel or bronze, wrapped around a cast iron core, with a port opening range of 0.002 in. to 0.015 in. That for coolant filtration offers a porosity range of 0.020 in. to 0.045 in., utilizing a brass perforated sheet as filter media.

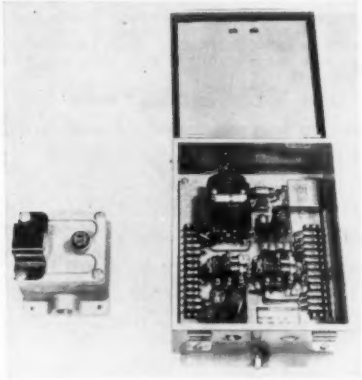
An interval repeat timer provides completely automatic self-cleaning and permits adjusting the cleaning cycle from a minimum 20-sec to a maximum 30-min period. According to the manufacturer, exceptionally long filtration cycles are possible with an extra large sump located below the filtering units. The design incorporates a large inspection port which also serves as a cleanout door.

A wide range of sizes are available with flow rates ranging from 120 gpm to 1200 gpm.

Front-End Loaders

Major features of the new M-M S-43 front-end loaders, Minneapolis-Moline states, are high lift, high dump position, double-acting lift cylinders and two double-acting bucket control cylinders. For use with Powerline 335 and 445 tractors, the S-43 loader operates with either M-M type A or B hydraulic systems.

new products



Vibration Monitor System

To protect rotating and reciprocating equipment, the Fielden Instrument Div., Robertshaw-Fulton, has developed a non-electronic vibration monitor system. Though sensitive to increases in vibration, the machine ignores both starting vibration and transient shocks normal to operation of pumps, motors, blowers, compressors and other units.

The system combines a detector and a control unit. Robertshaw Model 65 malfunction detector at left is mounted on protected equipment. Oil-tight Model 651 ac control unit at right is wired to detector and installed in remote location.

In operation the detector trips whenever vibration exceeds the preset vibration level. The control unit must reset the detector in rapid sequence several times before the shutdown time-delay relay, selected for a 2- to 5-sec delay, will actuate. The unit is held inoperative for a selected time of up to 120 seconds after starting to allow the protected equipment to reach full speed.

Good Plant Housekeeping Help

Rag cost and laundry bills in diesel plants can be sizeable. To cut costs some firms install their own washing machines for rags. Another alternative is use of disposable paper wipers. Scott Paper Co. offers absorbent 2-ply wipers for removing grease, oil, metal chips and other foreign matter. Lint-free, they are also suitable for polishing high-finish metal parts.

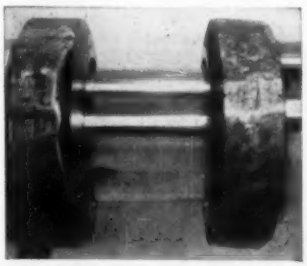
(*Continued on Page* 110)

THIS CRANKSHAFT JOB NEEDS A SPECIALIST

This is specialized work, rebuilding crankshafts—intricate, exacting, and naturally expensive. It's the kind of work that demands a specialist . . . and we are just that!

We've specialized in rebuilding crankshafts, because since 1916 we've *made* crankshafts. And who knows better than a maker what are the "musts" of a sound, economical repair job. We'll take your worn crankshaft and rebuild it, if salvagable, through the carefully controlled steps of grit blasting, replating, regrinding and thorough inspection. And we'll deliver it back with a guarantee for 100% performance that only a manufacturer-specialist can provide. May we quote on your next job?

For more details on crankshaft repair write for Bulletin RC-3



This is a finished, repaired crankshaft, after processing by National Forge.

NATIONAL FORGE
AND ORDNANCE COMPANY
Irvine (Warren County), Pa.

new literature

Laminated Disc Filters

Wm. W. Nugent & Co. has issued a 16-page bulletin on laminated fiber disc filters. The piece provides complete data on the design, construction, specifications and capacities of standard, high pressure and duplex models. Also reviewed are special purpose assemblies, accessories and installation details.

Torque Converter Drive

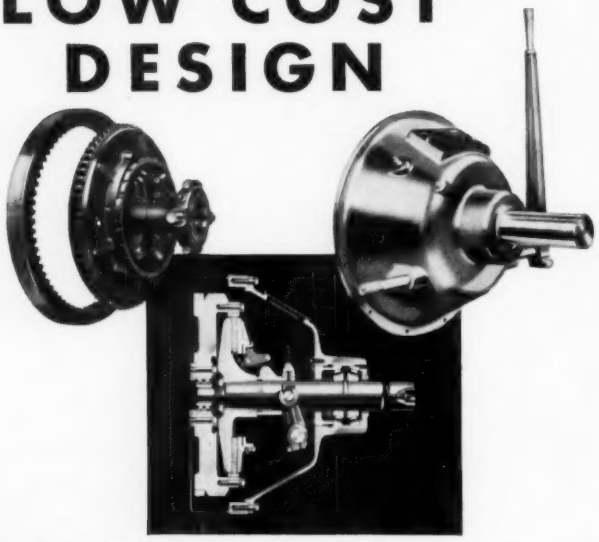
Principles of torque converter drive in crawler tractors are outlined in a new folder by Construction Machinery Div., Allis-Chalmers Mfg. Co. It helps the reader translate torque converter drive features into work advantages. Action photographs show A-C torque converter drive-equipped tractors on various jobs.

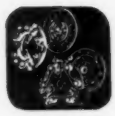
ROCKFORD

POWER TAKE-OFFS

PROJECT

LOW COST DESIGN





Small Spring Loaded

Heavy Duty Spring Loaded

Oil or Dry Multiple Disc

Heavy Duty Over Center

Power Take-Offs

Speed Reducers

ROCKFORD CLUTCHES constantly are being redesigned to eliminate unnecessary weight, size and parts. Operating ease and efficiency are improved. Vibration is reduced. Maintenance is decreased. Before you specify the clutches, power take-offs or speed reducers for your new model, it will pay you to learn how ROCKFORD design advantages will benefit the competitive position of your product.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER-TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD Clutch Division BORG-WARNER

1301 Eighteenth Ave., Rockford, Ill., U.S.A.

Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

CLUTCHES

Help in Figuring Pipe Friction Losses

Handy pocket slide calculator for figuring water pipe friction losses has been developed by Allis-Chalmers Mfg. Co.

Data for computing water pipe friction loss are based on standards of the Hydraulic Institute. Measuring 9¼ in. by 4 in., this practical calculator carries a table of equivalent lengths of new straight pipe for valves and fittings for turbulent flow. The slide can also be used for calculating paper stock pipe friction losses.

Worried by Thread Wear and Tear?

Recently issued by Rosan, Inc. is a 42-page catalog detailing self-locking thread inserts for almost every conceivable application. Types are available to withstand any condition of vibration, high stress or pressures, temperature changes and frequent disassembly.

Made in a wide variety of materials—steel, bronze, brass and other alloys, they provide long lasting threads for aluminum or other soft materials. They also restore worn threads on parts which otherwise would be scrapped.

Highly detailed, the book also gives complete data on installation tools.

Stock Oil Seals

Chicago Rawhide Mfg. Co. offers a 68-page illustrated oil seal catalog. The manual lists all CR seals carried in stock. A section includes materials available for use as sealing members —among them leather and a wide range of synthetic rubber compounds. A chart indicates the compatibility of each material with various media to be sealed.

The catalog includes complete engineering data on shaft material, finish, hardness, shaft size and tolerance, shaft speeds, eccentricity, pressure and lubrication. Complete installation procedure with diagrams are also given.

For your copy of Chicago Rawhide Oil Seal Catalog 856-C, just fill in the red post card provided in this issue.

new literature

Diesel Trouble-Shooting

When trouble-shooting, think before you act. That's the attitude Cummins helps you take with its new wall chart.

Common complaints and probable causes are spotlighted. It stimulates a check-list procedure and planned method for locating and correcting trouble causes in diesels. It reminds you to check the easiest and most obvious things first. Organized methods in trouble-shooting will save much time and trouble.

You'll want one of these wall charts for your shop.

New Construction Magazine

"Construction News" is the new quarterly published by Gar Wood Industries. The magazine will feature on-the-job stories of interesting construction techniques, explanations of unusual equipment applications and a regular section on service. Of interest in the current issue is an article on how the Air Force uses a 20-ton truck crane to launch space balloons. The Service Corner gives useful tips on how to increase the life of construction equipment. You can get your free subscription to "Construction News" by filling out the post card in this issue of DIESEL POWER.

Heavy-Duty Thermometers

Diesel Plant Specialties Co. describe a broad assortment of thermometers, including Navy types, in a new factual bulletin. Built to their own design, the thermometers are offered in many sizes with a wide range of sensing elements and fittings.

Complete data is also given on liquid levelometers, Kiene indicators, indicator valves, alarm switches and howlers. Pressure and temperature engine protection devices are included.

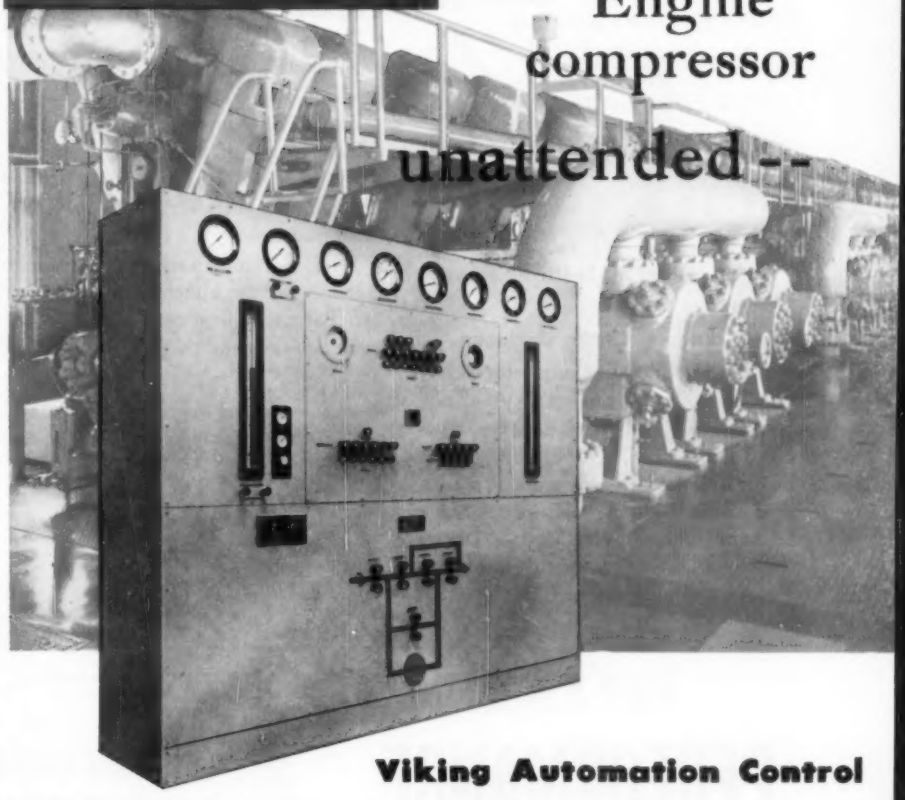
The maker stresses all items are guaranteed and ready for immediate shipment. Diesel Plant Specialties provide repair facilities for their equipment, too.

Just check the reply card in this issue for your copy of this detailed DPS bulletin.

AUTOMATION TAKES OVER

VIKING AUTOMATIC SEQUENCE CONTROL SYSTEM

runs Giant Engine compressor unattended --



Viking Automation Control

STARTS-OPERATES-CONTROLS-MONITORS and STOPS

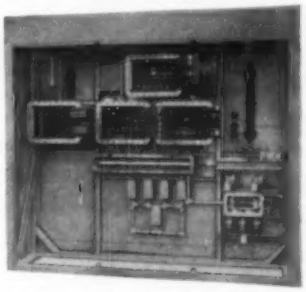
To provide an operating control system that would be completely automatic and fail-safe in starting—operating—controlling—monitoring—and stopping this 1300 HP engine compressor; Viking Instruments designed and built this automatic sequence control system for Ingersol-Rand.

Designed to permit complete, unattended, remote control operation, this Viking control system automatically operates all starting controls—brings the engine to slow speed until pressure and temperature requirements are met—then checks and loads the compressor and brings unit to full operating speed.

This control system monitors all oil, water, and exhaust-temperatures and pressures. Any abnormal condition occurring in starting or operation is instantly indicated by visible and audible alarm signals. If not corrected, the control system automatically starts the shut-off sequence by slowing engine compressor, unloading compressor and shutting down all operations.

Viking Automation engineers can design and build automation controls to your specifications, To obtain further information on this unique Viking Control System you are invited to write or call.

This control panel contains a full complement of recording gauges, indicating lights, alarm signals, and other indicators to permit continuous checking of operation, either manually or by remote control.



Rear view of control system shows circuits installed in explosion proof boxes, easily accessible for checking and servicing.

VIKING

Viking Instruments, Inc. East Haddam, Conn.

Designers — Engineers — Builders

Automation — Safety — Temperature — Pressure — Quality-Control Systems

organizational news

John M. Smidl

Witte Engine Chief Engineer

John M. Smidl is now chief engineer of Witte Engine Works of U. S. Steel's Oil Well Supply Div. Mr. Smidl joined this firm last October as assistant to the general manager of the Witte plant. Prior to that, he was with Electro-Motive Div., GM. He is a member of SAE and Pi Tau Sigma honorary engineering society.

Two Clark Appointments

Two product sales managers have been named by the Industrial Truck Division, Clark Equipment Company.

Phillip E. Campbell was appointed sales manager of the engine-powered truck section. He has been with Clark for 15 years serving in various sales positions.

John Borman was named sales manager of the attachments section. Mr. Borman joined this company in 1953 as assistant to the vice president.

P. Campbell

J. Borman

Dr. F. W. Lohmann

Diesel Energy Corp. V.P.

Dr. F. W. Lohmann has been appointed vice president in charge of engineering and research of Diesel Energy Corp. This New York concern imports, services and distributes Deutz diesel engines. Before coming to the United States, Dr. Lohmann headed the Generator Div. of Kloeckner-Humboldt-Deutz AG. in Cologne.

Here's Why

PERFORMANCE IS BETTER WITH Bendix STARTER DRIVES

CHECK and COMPARE THESE FEATURES

- Starting motor can be mounted more easily and in more positions.
- Requires no actuating linkage—solenoid can be placed in any convenient position.
- Simple in design—has fewer parts—needs fewer adjustments.

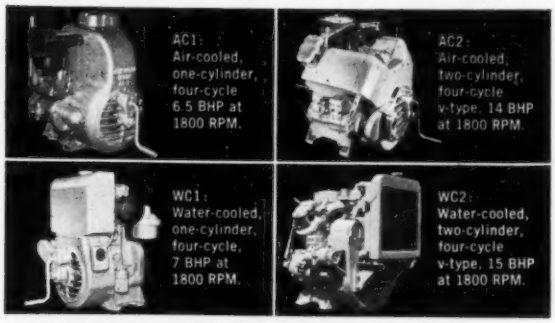
It takes a truly outstanding product to receive over 100,000,000 endorsements. Yet, that's the number of Bendix Drives that have been installed. No other starter drive approaches this record of outstanding performance. That is why, whatever your type of diesel or whatever its purpose, it will pay you to specify Bendix* Starter Drive for the most economical installation and dependable performance. *REG. U.S. PAT. OFF.

ECLIPSE MACHINE DIVISION of Bendix AVIATION CORPORATION
ELMIRA, NEW YORK

Export Sales: Bendix International Division, 205 E. 42nd St., New York 17, N.Y.

THE BIG 4 IN DIESEL POWER

AMERICAN MARC Inc. dominates the field of lightweight, low-horsepower Diesels by building its diversified line from the "Big Four" basic models illustrated here. Purchase and maintenance of engines and parts are simplified by the use of these compact and rugged prime movers.



AC1: Air-cooled, one-cylinder, four-cycle 6.5 BHP at 1800 RPM.

AC2: Air-cooled, two-cylinder, four-cycle v-type, 14 BHP at 1800 RPM.

WC1: Water-cooled, one-cylinder, four-cycle, 7 BHP at 1800 RPM.

WC2: Water-cooled, two-cylinder, four-cycle v-type, 15 BHP at 1800 RPM.

AMERICAN MARC also manufactures Diesel generating plants from 3 to 10 KW (AC or DC, and industrial three-phase), Diesel pumping units from 4 to 1700 GPM, marine propulsion, refrigeration units and power-packages for other services. American MARC can adapt any of its Big 4 engines to fit every job requiring from 5 to 20 BHP.

SOME DESIRABLE SALES TERRITORIES ARE STILL OPEN. INQUIRIES ARE INVITED FROM REPRESENTATIVE DEALERS.

AMERICAN MARC INC.
DIESEL ENGINES
1601 West Florence Ave.
Telephone OR 8-7174
Dept. P-77
Inglewood, Calif.

AMERICA'S LARGEST MANUFACTURER OF AIR-COOLED DIESELS

KIENE®

MODEL K-120

universal peak firing and compression pressure indicator

Adaptors for most models U.S.A. engines. Others made to order at reasonable prices.

The Model K-120 is the only maximum pressure indicator that can be used as a compression tester on small, high-speed engines and as a firing pressure indicator on engines having indicator valves. Patented Kiene diaphragm type check valve of stainless steel has no springs or piston, no complicated adjustments, temperature corrections or pressure loss. Bleeder valve permits release of indicator pressure for repeat readings. This instrument gives true pressure readings with an uncompensated gage.

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE., FRANKLIN PARK, ILLINOIS

organizational news

New Nalco Directors

J. L. Gibboney has been elected a director of National Aluminate Corp., Chicago. Also announced was the appointment of Dr. J. W. Ryznar as technical director in charge of general research and development.

S. G. Paddock

Burgess-Manning Promotion

S. G. Paddock stepped into the office of executive vice president of Burgess-Manning Company, Libertyville, Illinois. Long associated with this company, he most recently served as vice president in charge of the Industrial Silencer Division.

Eugene L. Miller

New Chief at Cooper-Bessemer

Upon recommendation of L. F. Williams, board chairman, the directors of The Cooper-Bessemer Corp. elected Eugene L. Miller its new president and general manager. At the age of 38, Mr. Miller becomes the youngest president to head this 124-year old engine and compressor firm.

An Oklahoma A & M graduate, he joined this corporation in 1946 as project engineer. In 1954, he became assistant general manager and shortly thereafter general manager. Since that time he has initiated a new product development program in the petroleum and petrochemical fields, and expedited expansion of manufacturing facilities.

National Supply Post

John D. Mitcham has been named sales engineer in the Industrial Sales Division of National Supply Co. With headquarters at Toledo, he will be primarily concerned with sales and service of National torque converters in industrial markets. Mr. Mitcham has served this company for 22 years.

Perry A. White

B-L-H General Manager

Perry A. White has been promoted to vice president and general manager of Eddystone Division, Baldwin-Lima-Hamilton.

In 1943, he joined General Machinery Corp. which through merger became part of B-L-H.

organizational news

Three Named By Cooper-Bessemer International

W. C. Young, John O. Fighter and Harry A. Cecsarini have joined Cooper-Bessemer International as sales engineers. The three men will devote their efforts to sales, application and engineering of engines and compressors for shipment outside of this country.

Representing Young Radiator

Flournoy & Everett, Inc., Downey, Calif., has been appointed engineering, sales and service representative for Young Radiator Co., shell and tube heat exchanger products in southern California.

For 16 years, Flournoy & Everett has been representing the Industrial and Oil Field Div. of Young. Products handled include a wide line of coolers and radiators, and now shell and tube heat exchangers also.

REA AWARD WINNERS

THESE "TOP" EFFICIENCY PLANTS USE MAXIM SILENCERS

Here are the "Highest Efficiency Award" REA plants for 1956, and they are 100% Maxim equipped for quiet, efficient, round-the-clock operation. All seven Cooper-Bessemer engines, three at Caro, Michigan and four at Poplar Bluff, Missouri, have Maxim Exhaust Silencers. For this kind of efficient, trouble-free, effective silencing consult Maxim. Bring your file up-to-date by using the coupon below.

Top left: Caro, Michigan Plant of Thumb Electric Cooperative

Top right: Poplar Bluff, Missouri Plant of M&A Electric Cooperative

THE MAXIM SILENCER COMPANY

Subsidiary of Emhart Manufacturing Company

93 Homestead Ave., Hartford, Conn.

Gentlemen: Please send bulletins on silencers for: ☐ WASTE HEAT RECOVERY

☐ INTERNAL COMBUSTION AND STEAM ENGINE EXHAUST AND INTAKE ☐ AIR COMPRESSOR INTAKES AND DISCHARGES ☐ VACUUM PUMP DISCHARGES

☐ BLOWER INTAKES AND DISCHARGES ☐ STEAM, AIR OR GAS DISCHARGES ☐ JET AIRPLANE ENGINE EXHAUST AND INTAKE

NAME _____

COMPANY _____

ADDRESS _____

W. H. Madden

New Product Manager at Thew

W. H. Madden is loader sales manager for the new line of front end loaders now being merchandised by Thew Shovel Co. Distribution of these "Moto-Loaders" will be confined to selected areas in keeping with production availability.

Representing American MARC

Waukesha Sales & Service Co., Houston, has been appointed direct factory dealer for American MARC, Inc. The firm will handle both industrial and marine lines in six southern states and will carry complete stocks of service parts of American MARC lightweight diesels.

De Laval Shop Changes

Paul S. Nurko has been made general superintendent of all production shops for De Laval Steam Turbine Co. Milton Hammond is now superintendent of the turbocharger shops.

Other changes are Leonard Schwarz, superintendent of the main shop; Kenneth Lippincott, superintendent of standard products shops, and Joseph Basso, supervisor of manufacturing research.

Porsche-Diesel Sales Director

Charles T. Collins has been named director of sales for Porsche-Diesel Importers, Inc., U. S. distributors of air-cooled tractors and engines. He will direct the establishment of a nationwide sales and service organization from headquarters in Bridgeport, Conn. A veteran of the diesel engine industry, Mr. Collins has served such firms as Eastern Diesel Engineering Co., Hercules Motors and American Bosch.

Charles T. Collins

Lyle M. Jensen

Cummins Distributor

This is Lyle M. Jensen, new Cummins distributor operating under the name of Cummins Diesel Sales, Inc. Before acquiring the Cummins St. Paul and Minot operations, Mr. Jensen ran the Fleet Supply & Machine Co.

In Memorium

Roy P. Magarigal died suddenly at the age of 45. He was head of the firm bearing his name in Media, Pa. He represented such firms as Amot Controls, Pedrick Pistons, Actuator Products, Viking Instruments and Wilkening Manufacturing.

A 1934 graduate of the University of Pennsylvania, he was an associate member of the American Society of Engineers.

Mr. Magarigal is survived by his wife, Teresa, and four children, Roy P. Jr., Joan, Eileen and Brian.

DeLuxe Sales Post

Rex L. Curry is now regional sales manager of the Original Equipment Sales Div., DeLuxe Products Corp. His new duties will revolve around sales of oil filters and replacement cartridges to manufacturers who use DeLuxe filters as original equipment.

Joins Cuno Staff

Walter J. Holder has joined Cuno Engineering Corp. as manager of the Micro-Klean Filter Division. Previously with Indiana Commercial Filters Corp., he is a member of the American Society of Tool Engineers and the American Society of Lubrication Engineers.

Walter J. Holder

Allis-Chalmers Plant Now in Australia

Allis-Chalmers Mfg. Co. has purchased the assets of Thomas C. Pollard Pty., Ltd. in Newcastle, and set up a wholly owned subsidiary, Allis-Chalmers Australia Pty., Ltd.

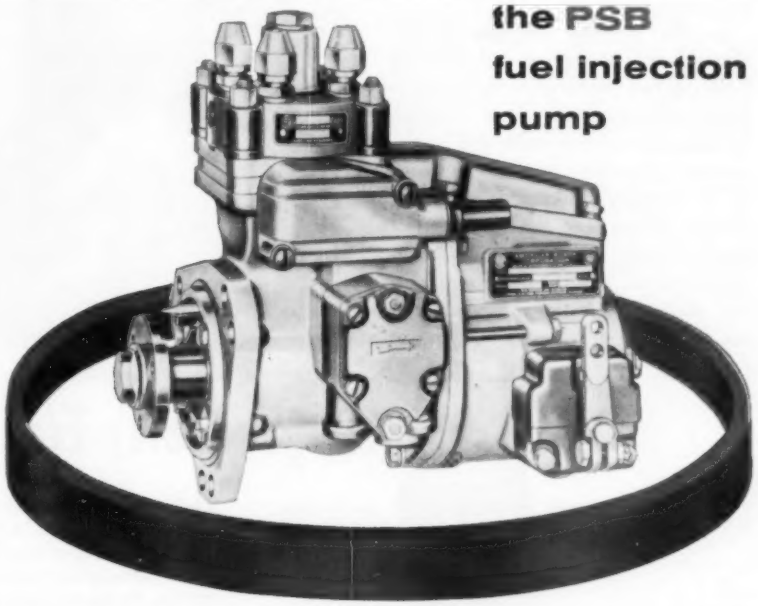
The plant will continue to make motor graders. Land has been bought for expansion and production will be increased to include other construction machinery.

C. A. Rechner heads up the company's Australian operations.

Acheson News

Arthur J. Stock has been appointed research and development manager for Acheson Colloids Co., Port Huron, Mich. He replaces Dr. Harold J. Dawe who is now research director for the parent company, Acheson Industries, Inc. Before this, Mr. Stock was project director for Chicopee Mfg. Corp. He is a member of the American Institute of Chemical Engineers and American Chemical Society.

(*Continued on Page* 112)



the PSB fuel injection pump

TOP VALUE

. . . *from outstanding performance* —proven by the unexcelled service records of the more than 140,000 American Bosch PSB pumps now in use.

. . . *from outstanding design* —featuring simple construction with fewer parts . . . positive governor control . . . precise fuel metering and distribution . . . replaceable hydraulic head for fast field servicing.

. . . *from unmatched operating economy* —efficient design and careful manufacture assure top diesel engine performance . . . long, trouble-free operation with minimum maintenance and repair.

. . . *from low-cost repair service* —by factory-trained experts at Authorized American Bosch Service Stations . . . nearly 200 in North America, Hawaii, and Puerto Rico . . . all equipped with special tools and test equipment, and stocked with genuine American Bosch replacement parts.

4847

AMERICAN BOSCH
DIVISION
AMERICAN BOSCH ARMA
CORPORATION
SPRINGFIELD 7, MASS.

news of our industry

(*Continued from Page 95*)

Gulf's New Laboratories

Enlarging its already extensive research facilities at Harmarville, Pa., Gulf Oil Corporation recently uveiled three new laboratories, each housing ultra-modern equipment. Sounding the keynote of these new developments, Gulf President William K. Whiteford stated in his dedication address that "We probe the past, scrutinize the present, and peer into the future."

In the William Larimer Mellon Production Laboratory and Drilling Building new techniques for recovering greater amounts of oil more quickly and more economically will be developed. Extending through the roof of the Drilling Building is an 80 ft. derrick, shown here, equipped for full scale drilling operations and experiments looking toward improved drilling methods. Under intensive testing is the recently-developed Impact Drill for speeding up penetration of hard rock formations.

One of the methods under investigation for achieving greater oil production is the burning of part of the oil under ground, (in situ combustion) which warms the reservoir and increases the flow. Another method being tested is opening up crevices in the rock formation by hydraulic pressure, known as fracturing.

The Richard Beatty Mellon Automotive Products Laboratory, another of the new units, houses complete facilities for testing fuels and lubricants for internal engines. One of the aims here is to develop fuels that will yield more of the energy contained in them. Work of this nature accounts for the fact that a gallon of today's gasolene will do more work than 1½ gallons did a few years ago. Included in this laboratory are twenty individual test cells, each completely instrumented, a large dynamometer cold room and a blending building.

Of special interest in this new group is the Nuclear Science Laboratory equipped with a three-million volt Van de Graaff Particle Accelerator, said to be the most powerful and versatile radiation source in private industry today. Every possible application of nuclear energy for the manufacture of petroleum products will be explored with these facilities, said Mr. Whiteford.

Dependable, Trouble-Free! Gentlemen,

"I know. It's the shoe that supports the crosshead in this Ingersoll-Rand compressor. It's all one piece because this Alcoa alloy is strong, needs no hard backing."

"Sure, that's how Alcoa makes bearings. Nothing to come apart. No hard backing to damage other parts in the unlikely event of bearing failure."

PIE Tries Two-Way Radio

Pacific Intermountain Express tried two-way radio for city pick-up dispatching from their Oakland, Calif. terminal. Results were so good they're using it now in their new Los Angeles depot and will make other installations eastward along their line-haul routes.

The system is the new Motorola private line radio which shuts out most interference from other stations on the same channel.

Here are some benefits • PIE quotes: Mobile radio saves from four to ten hours of productive truck time per week by expediting reports of road breakdowns. .

There are an average of 300 "wild" or non-regular daily pick-ups. Most of these can be handled by the nearest radio-equipped truck. Savings in mileage are considerable.

Many minutes, even hours of waiting time are saved when a driver can get immediate instructions on questions.

Carbon Monoxide Comparison Test

Oxy-Catalyst has published a significant chart. It compares carbon monoxide concentration resulting from LPG lift trucks operating with standard mufflers and those using OCM catalytic exhaust purifiers.

Two lift trucks were tested for eight hours in an enclosed 120 ft by 120 ft by 20 ft warehouse. Results were rated as to percentage of carbon monoxide and danger to humans.

These tests showed, the company reports, that trucks without the catalytic purifier produced 0.08% carbon monoxide during a four hour period. That's enough to cause headaches and nausea. The second truck produced 0.10%, or enough to be considered dangerous. After six hours, the level had risen for both trucks so that the first now had produced dangerous amounts of carbon monoxide. Amounts from the second truck had reached fatal concentration.

Then the same trucks were equipped with OCM catalytic purifiers and tested. Production of carbon monoxide was so reduced, the firm says, that even after eight hours of operation, amounts were not great enough to have any perceptible effect on humans. Copies of this chart can be requisitioned on the postal card included in this magazine.

GE Exports $6½ Million Diesel-Electric Locomotives

As part of a rail modernization program, Argentine State Railways has purchased $3½ million diesel-electric locomotives. This order calls for 20 universal export 1320-hp units weighing 85 tons. They will be used for both passenger and freight service.

National Railways of Columbia has contracted for $3 million of the same GE diesel-electrics. These 18 units will go into operation on the narrow-gauge Ferrocarrile de Centrales.

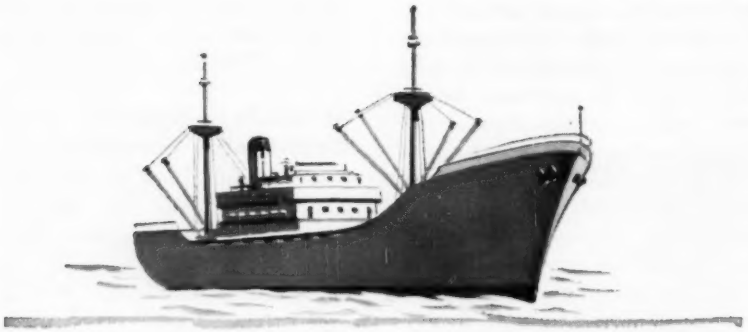
You Can't Beat This Alcoa Alloy Bearing!

"Very unlikely! Alcoa bearing alloy embeds well, resists scuffing and overheating. Also it's highly conductive, in many machines runs 20° cooler than other bearings."

"Alcoa bearing alloy is so good it's used for this compressor's main and crankpin bearings, too. And although bearing loads on compressors are well under 1000 psi, Alcoa alloy can take up to 10,000 psi where required."

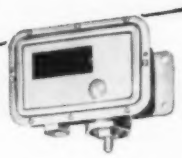
"No other bearing metal has aluminum's unmatched combination of advantages. Get more information. Write: ALUMINUM COMPANY OF AMERICA, 1988-G Alcoa Bldg., Pittsburgh 19, Pa."

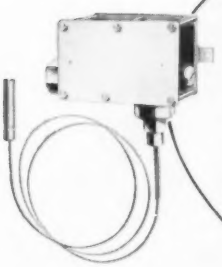
Performance
is a matter of record!



DETROIT Controls and Valves
have long met the most exacting Federal and marine specifications.

☆ High Shock ☆ Submersible
☆ Watertight ☆ Splashproof
☆ Pressure Tested





Pressure and temperature controls developed over 75 years for Federal and marine vessels. Specifically designed Detroit Controls limit, regulate or guard pumps, diesel engines, heating and air conditioning systems, lube oil temperature and pressure alarms, desuper-heaters, clutches and other marine installations.

From 30 inches of vacuum to 12,000 lbs. pressure, from −100° F. to +600° F. and up to 550V. AC-DC!

Detroit's D. T. Williams valves, such as No. 912 shown here, may be used for steam or hot water with pressures to 200 lbs., temperatures to 500° F.; or water, gas and air to 400 lbs. at 150° F.; for oil to 200 lbs. pressure at 250° F.

Consult with our sales engineer... or request Catalog No. 100 on Detroit Controls, Catalog No. 800 on D. T. Williams Valves.

5900 Trumbull Ave.
Detroit 8, Mich.

DETROIT CONTROLS
Division of American-Standard

Canadian Representatives: RAILWAY AND ENGINEERING SPECIALTIES LTD., Montreal, Toronto, Winnipeg

news of our industry

Con Diesel Fifteen Years Old

Consolidated Diesel Electric Corp. just celebrated its 15th birthday. Honored at the dinner marking the event were three employees who joined the firm within one year of its founding. These old-timers in length of service are Richard Jones, Ruben Schimerling and Alfred Stamchina.

The corporation builds special power units, many of them diesel powered, generators, jet aircraft ground support units and other "power packages".

Promoting Diesel Careers

Ferris Institute, Big Rapids, Mich., is another school doing its share to fill the need for skilled diesel technicians and mechanics. Their diesel and heavy equipment course covers operation theory, trouble diagnosis, corrective procedures and preventive maintenance.

Heavy accent is on actual work on diesel engines and components used in trucks, buses and other heavy equipment. Lectures and demonstrations round out the technical training.

Profit in RR Passengers

Passenger business can be profitable. This reminder comes from Edward G. Budd, Jr., president of Budd Co.

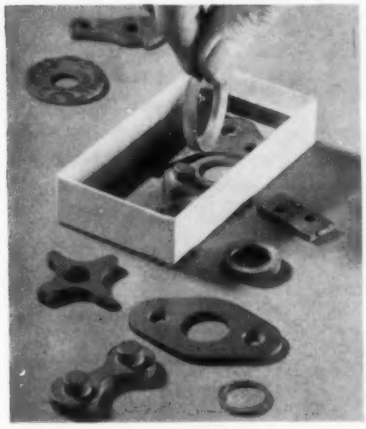
Major passenger car builders point the way to profits with new models and new features designed with an eye on economy and appeal.

Already on the scene are these profit builders: The self-propelled Rail Diesel Car, Vista Domes, Talgo and Train X, double-decker commuter cars, Hi-Level equipment, Slumbercoach, Keystone, Aerotrain and now the Pioneer III. They represent a healthy number of innovations to attract profitable business in passengers.

We'll cite just one of many increased traffic records. The new Hi-Level El Capitan on the Santa Fe between Chicago and Los Angeles boosted passenger miles by 26% in its first month of service.

Now is the time for railroads to think and do something about plus profits from passengers.

news of our industry



See-For-Yourself Castings

A free sample kit of castings is offered this month by Sparta Foundry Division, Muskegon Piston Ring Co. The quality of materials and workmanship can thus be examined. Samples show cored casting holes, recesses and projections. They give evidence, too, of how parts have been surface ground and finish machined to meet exact specifications.

Sparta points out parts have been designed to reduce or eliminate certain machining and finishing operations with width tolerances held to within plus or minus 0.001 in.

Requisition your free kit on the post card provided in this magazine.

Super Rail Service Awaits Tourists Abroad

Visitors to Europe will have a network of rapid diesel railcars to speed their travels, French National Railroads tell us.

Belgium, France, Germany, Italy, Luxembourg, Netherlands and Switzerland are the seven nations who have organized these Trans-Europ-Expresses.

Running time has been cut to a minimum and customs inspections are made while the trains roll on. Since the cars are self-propelled, there is no halting at each border for engine and crew changes.

Refinements of service offer air conditioning, soundproofing and meals brought to each passenger. Conductors double in brass as stewards.

ASME Administrator

Oscar B. Schier, II, has been designated secretary of the American Society of Mechanical Engineers by unanimous vote, it was announced by Dr. William F. Ryan, ASME president. Mr. Schier succeeds Clarence E. Davies who retired as secretary after 23 years of service to this 50,000-member Society.

Marine Corps Orders Low-hp, High-Speed Diesels

American MARC has begun shipment of an order from the Marine Corps for $200,000 worth of prime movers to power permanent magnet generators made by O'Keefe & Merritt. The units are highly specialized components produced in this country only by the joint facilities of these two companies.

The contract follows prototypes delivered by American MARC six months ago. It is the forerunner, the firm says, of much larger orders of the same diesels for use in electronic programs of the Marine Corps.

Dollars for Iron Design

Here's a chance for some metallurgist to hit the jackpot. Gray Iron Founders' Society, Cleveland 14, Ohio, has a Design Contest where everyone wins. All entrants will receive a set of six technical manuals. Seven awards range from $500 down to $50. According to the rules a mere suggestion on a new use for gray iron castings can cop the first prize.

Hurry, if metal-working is your field, to get your entry blank. Contest closes August 20.

Kenworth Diesels Go To Fortier

Fortier Transportation Co. has added 14 Kenworth Model 521 cab-beside-engine trucks to its fleet of 1000 highway units. The new diesels are equipped with Cummins NHB 210-hp engines. They have single rear axle drive with a two-speed rear axle.

According to Kenworth, an easy-ride stabilizer incorporated in this design resists sway, equalizes the load and assures a level ride with flexible bus-type springs.

KATO GENERATORS
Fit The Engine Of Your Choice!
CHOICE OF FLEXIBLE COUPLINGS
Adaptable to ALL ENGINES with SAE Bell Housings
There is a size in the Kato line of generators with the electrical characteristics to meet your specific requirements. By means of one of Kato's flexible steel, disc-type couplings, as illustrated, Kato generators easily connect to any diesel or gasoline engine. All standard frequencies . . . 25, 50, 60 and 400 cycles, plus many special frequencies to 1200 cycles (both fixed and variable). Now 400 cycles to 250 KW. 60 cycles to 500 KVA. One or two bearing designs. Extra lead wires brought out insure a maximum voltage selection.
KATO
ALSO MOTOR GENERATOR SETS
Wide variety both fixed and variable frequency ranges starting at 25 cycles, up to 1200 cps. 400 cycle line now up to 250 KW.
WRITE FOR FOLDER
Builders of Fine Electrical Machinery Since 1928
PHONE 5031
SPECIAL ORDERS WELCOMED
KATO Engineering Company
1408 First Ave. Mankato, Minnesota

new products

(*Continued from Page 99*)

New Protective Coating

For petroleum storage tanks and silencers, Permaspray has developed a corrosion-resistant coating. It can be applied by brush, roller or spray. The maker states metals properly cleaned and coated were submerged 18 months in fuel oil without signs of breakdown. For best protection, two coats of Permaspray should be used—each about 3 mils thick. Each coating dries to a hard finish in four hours.

Liquid Detergent For Steam Cleaning

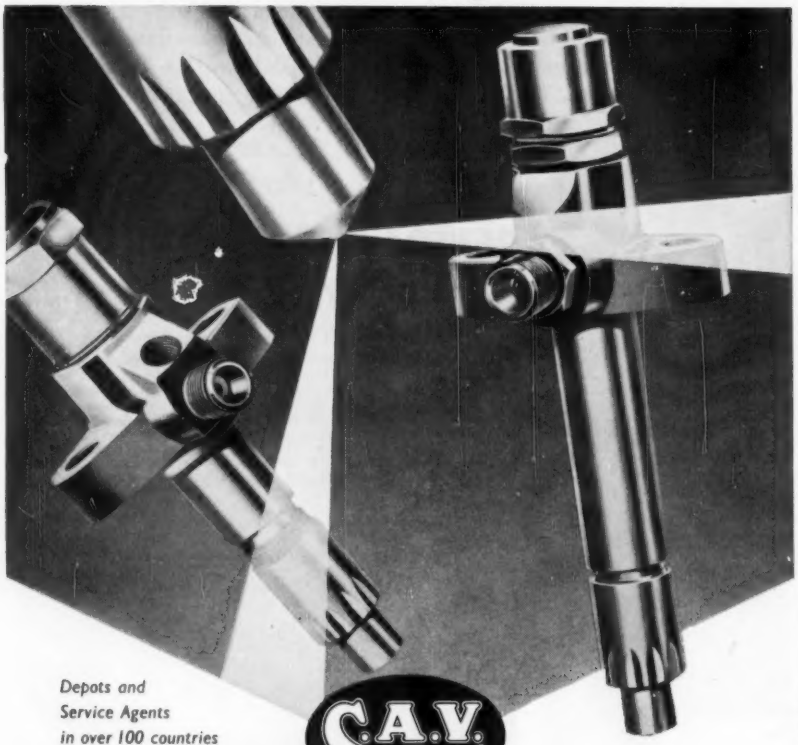
Oakite LSD is a new liquid detergent for use in steam-cleaning equipment, whether self-generating or operated by a plant's own steam supply. It will handle a wide variety of steam-cleaning operations ranging from light to medium-heavy duty.

Oakite LSD is said to provide effective soil removal at concentrations of 1 to 2 oz to each gallon of water delivered by the gun. Used as recommended, it is claimed to be safe on steel, brass, magnesium and painted surfaces.

The World's Leading Manufacturers of

FUEL INJECTION EQUIPMENT

for Diesel Engines



Depots and Service Agents in over 100 countries

C.A.V.

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of

LUCAS ELECTRICAL SERVICES, INC.

Head Office: 653 Tenth Avenue, New York 36, New York

Sales Office: 14820 Detroit Avenue, Cleveland 7, Ohio

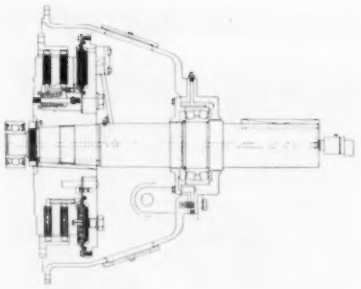
West Coast: 5025-29 W. Jefferson Blvd., Los Angeles 16, California

Canadian Distributors:

Joseph Lucas (Canada) Ltd., Head Office: 11 Davies Avenue, Toronto 8, Ontario

Branch Office: 3401 St. Antoine Street, Montreal 30, Que.

AP174-819



Air-Operated Power Take-off

Twin Disc Clutch introduces a new air-operated, remote-controlled friction power take-off. Designed to SAE standards, it is available for use with engines up to 600-hp output in any industrial application where standard power take-off is used.

The unit combines Twin Disc Model PO air clutch with standard friction power take-off. Engagement and disengagement is accomplished by turning an air valve, rather than a manually-operated handle.

A rotary seal has been added to the output shaft end to permit actuating air to enter the clutch through a drilled passage in the shaft. Air pressure of 90 to 100 psi will produce all the torque normally needed, but 130 psi air can be utilized if required.

Air-operated conversion kits are available for certain Twin Disc standard power take-off models already in the field—B-118P, B-218P, B-124P and EH-124P.

Front End Loaders by Thew

Thew Shovel Company is now making a complete lne of rubber tire front end loaders to supplement its power shovels and cranes. Being marketed under the name "Moto-Loaders", limited quantities of ½-yd and 1¾-yd models are already available. Additional models will follow. All of these units will incorporate 4-wheel drive, planetary axles, power shift transmission, torque convertor, simplified controls, safety arms and accessory equipment for greater job application.

For more data, use the red post card in the back of this issue.

Service Section

Waukesha

(*Continued from Page* 91)

With crankcase inverted, properly cleaned, and oil holes plugged, install jig, tool #49478. The jig should enter the tappet holes smoothly. Clean up any burrs or damaged areas which interfere with proper seating. Clamp the "C" washer under the retaining nut snugly but not with excessive torque.

Using the ½-in. bore guide bushing, end mill the case to a depth of 1½-in. This may be controlled by measuring the projection of the end mill from the end driver. Thus, the driver will bottom against the bushing flange at the proper depth.

Replace the ½-in. bore guide bushing with the 5/16-in. bore bushing and drill through into the push rod chamber. This hole must be tapped through to the push rod chamber for a ⅜-16x1½-in. cap screw.

Invert crankcase and counterbore for the tappet guide shoulders. The cutter pilots in the existing tappet bores, however, control the cutting action to avoid chipping the cutter teeth by allowing them to chatter too violently on the casting fillets.

Both the drilling and counterboring operations may be made with a heavy-duty a ½-in. electric drill, or larger and with a cutting speed of about 500 rpm or less. The standard drill chuck must be replaced with an adapter suitable for a No. 3 Morse taper driver.

The remainder of the assembly operations follow routine practice. Be sure no trace of metal cutting remains and that the tappets and associated parts are well lubricated with engine oil. The new cams, part number 125023 for the model WAKD, and part number 125023-A for WAKB, WAK, and WAKR engines, have different dwell characteristics from former cams. Therefore the flywheels should be remarked so the intake opening #1 (INO #1) and exhaust opening #1 (EXO #1) are located at 10° BTC and 45° BBC, respectively.

Both intake and exhaust valves are set cold to 0.016-in. at the rocker. The cam clearance is 0.099-in. on the base circle, rocker arms ratio 1.75, and the total cam lift 0.384-in.

Cat

(*Continued from Page* 91)

and "A" with the terminals connected, as the regulator resistors will probably be destroyed. Once the resistors are destroyed, overcharging of the battery will result.

Electrical problems, in most cases, are difficult to trace unless testing equipment is available. But, frequently difficulties are the result of frayed cables, loose connections, corroded terminals, dirty batteries or other minor deffects which should be discovered with periodic checks. Time spent in maintaining the electrical system will be well repaid by fast, regular starting.

Cummins

(*Continued from Page* 91)

perform either of the above service operations.

Normal draining of the cooling system can be made by removing the pipe plug in the end of the oil cooler.

Remove lubricating oil from the engine by taking out the oil pan and gear case cover drain plugs.

YOUR SHOP CAN POSITIVELY

GUARANTEE HORSEPOWER

with Clayton's Engine Dynamometer!

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organizational news

(*Continued from Page* 105)

Garlock Product Manager

William J. Lauter is the new product manager for the hydraulic-pneumatic line of products of Garlock Packing Co. Before this promotion, Mr. Lauter was a sales engineer in the Philadelphia office.

Allis-Chalmers News

All officers and directors of Allis-Chalmers Mfg. Co. were re-elected at their recent annual meeting.

Also announced was the appointment of Dr. D. Kececioglu as assistant to the director of mechanical engineering. He joined A-C in 1952 as research director and is a current contributor to the ASME publication "Applied Mechanics Reviews".

Other A-C appointments are: W. E. Korsan, manager of sales, electrical application dept.; J. C. Lovelace, manager of the St. Louis district, and W. M. O'Connor, manager of the Amarillo district.

Gardner-Denver Elections

George W. Gutekunst, general sales manager, has been elected a vice president of Gardner-Denver Co.

C. H. Rieman, recently named general manager of the Denver plant, was also elected a vice president of the firm.

Purolator Names Four Firms

Four new sales representatives have been appointed by Purolator Products, Inc., Rahway, N. J.

K. C. Brown Co. will handle bulk and industrial filters in Kansas and the western half of Missouri.

V. Holm Hansen Co. will cover both bulk and industrial filter sales in Connecticut, parts of Rhode Island and Massachusetts.

Jay Besore & Associates will sell industrial filters in northern California and all but Clark County in Nevada.

Alpha Engineering Specialty Co. has been named industrial filter representative for 14 counties in New York and 12 counties in New Jersey.

Automatic Switch Names Distributor

Leinart Engineering Co., Knoxville, Tenn, is now distributor for Automatic Switch Company. The firm will stock Asco general purpose solenoid valves.

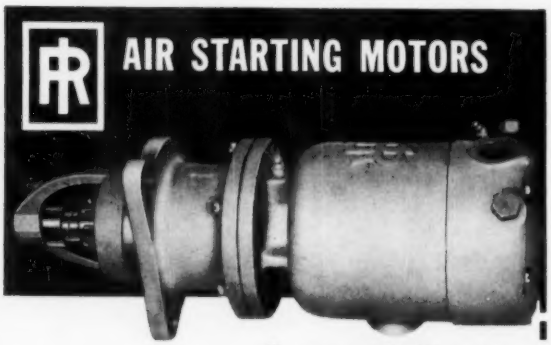
New Minneapolis-Moline VP

P. W. Mortimer has been appointed vice president and general manager of Minneapolis-Moline Trading Co. He assumes responsibility for all overseas operations. Mr. Mortimer has advanced through M-M ranks since joining the firm in 1916.

Cummins Opens New Shop

Cummins Sales and Service, Inc. have opened their fifteenth shop and office at Biloxi, Miss. The facility, designed to serve truckers, boat operators and other diesel users, provides sales and planning assistance, shop and field service and availability of Cummins diesel parts.

They also plan another shop at Wichita, Kansas, to replace existing facilities there.



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P3	A	M-P	4	3	3 1/2 x 5	28.25	1800	C	-	E-H	-	*	22	23	36	500
P4	A	M-S-P	4	4	3 1/2 x 5	28.5	1800	C	-	E	-	**	25	24	33	526
P6	A	M-S-P	4	6	3 1/2 x 5	57.5	1800	C	-	E	-	S	34	24	37	734
L4	A	M-S-P	4	4	4 1/4 x 4 3/4	53	1800	C	-	E	-	S	32	22	37	660
R6	A	S-P	4	6	4 x 4 1/2	67	1800	C	-	E	-	-	39	23	40	906
S6	A	S-M	4	6	4 3/8 x 5	89	1800	C	-	E	-	S	41	31	41	1100

* Parsons ** Self Change (Inadvertently these engine specifications were omitted from the April, 1957 issue.)

Crane Now Diesel Convert

This 1929 Brownhoist crane has been converted from steam to diesel and rebuilt from the cab up. Replacement power is a 6-71 Detroit Diesel engine with torque converter. Unused for several years, the repowered unit is now in service at Tennessee Products & Chemical Corp.

The crane loads iron ore and coke for pig iron production at a rate better than one railcar per hour. It moves up to seven 50-ton cars from stock pile area to blast furnace at one time.

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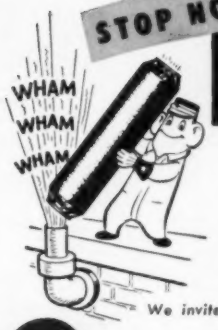

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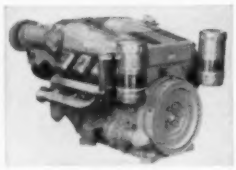

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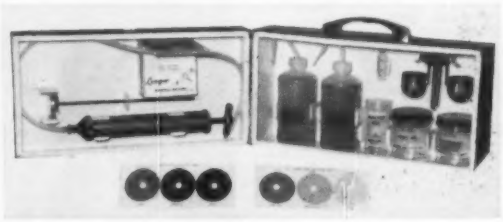

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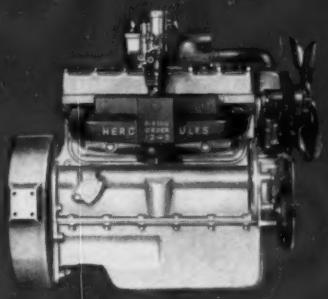

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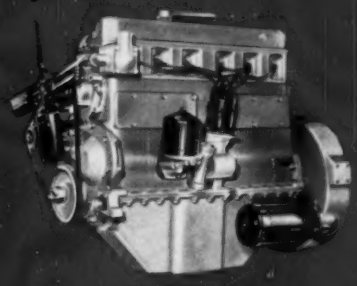
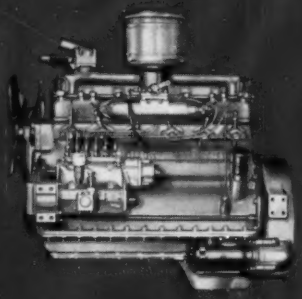


GO SERIES
Overhead Valve

These engines are available in 3, 4 and 6 cylinder sizes from 130 to 389 cu. in. displ. The GO series is interchangeable with the new DD series, thus providing the option of gasoline or diesel power.

DIESEL



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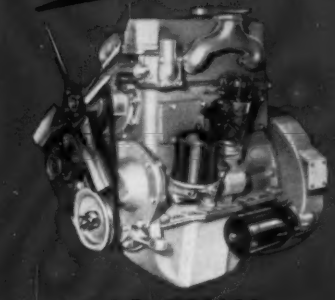

DD SERIES
Direct Injection

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NXA	3″ x 4″	56.5
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3 CYLINDER		
G. O. 130	3½″ x 4½″	130
G. O. 149	3¾″ x 4½″	149
G. O. 169	4″ x 4½″	169
4 CYLINDER		
ZXA	2½″ x 3″	59
ZXB	2⅝″ x 3″	65
IXA	3″ x 4″	113
IXB	3¼″ x 4″	133
IXLB	3¼″ x 4¼″	141
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6 CYLINDER		
QXA	3⅛″ x 4⅛″	190
QXB	3¼″ x 4⅛″	205
QXC	3⅜″ x 4⅛″	221
QXD	3½″ x 4⅛″	230
QXLD	3½″ x 4¼″	236.7
JXE	3½″ x 4¼″	245
JXB	3⅝″ x 4¼″	263
G.O. 260	3¼″ x 4½″	260
JXC	3¾″ x 4¼″	282
G.O. 298	3¾″ x 4½″	298
JXD	4″ x 4¼″	320
G.O. 339	4″ x 4½″	339
JXLD	4″ x 4½″	339
WXC-3	4¼″ x 4½″	383
WXLC	4″ x 4¾″	358
WXLC-3	4¼″ x 4¾″	404
TDXB	4⅜″ x 5¼″	474
TDXC	4½″ x 5¼″	501
RXB	4½″ x 5¼″	501
RXC	4⅝″ x 5¼″	529
RXLC	4⅝″ x 5¼″	529
RXLD	4¾″ x 5¼″	558
RXLDH	4¾″ x 5¼″	558
HXB	5″ x 6″	707
HXC	5¼″ x 6″	779
HXD	5½″ x 6″	855
HXE	5¾″ x 6″	935
‡HXE	5¾″ x 6″	935

‡Dual Carburetion

DIESEL

2 CYLINDER		
DIX-83	3⅝″x4″	83
DIXC	4″x4½″	113.1
DIXD	4¼″x4½″	127.5
3 CYLINDER		
D. D. 130	3½″x4½″	130
D. D. 149	3¾″x4½″	149
D. D. 169	4″x4½″	169
4 CYLINDER		
DIX4B	3¼″x4″	133
DIX4D	3⅝″x4″	166
D.D. 173	3½″x4½″	173
DOOB	3¾″x4½″	198.8
D.D. 198	3¾″x4½″	198
DOOC	4″x4½″	226.2
D.D. 226	4″x4½″	226
DOOD	4¼″x4½″	255
6 CYLINDER		
DIX6D	3⅝″x4″	248
DIX6-272	3¹⁵⁄₁₆″x4¼″	272
DJXB	3½″x4½″	260
D.D. 260	3½″x4½″	260
DJXC	3¾″x4½″	298
D.D. 298	3¾″x4½″	298
DJXH	3¾″x4½″	298
D.D. 339	4″x4½″	339
DJXHF	3¾″x4½″	298
DWXC	4″x4¾″	358
DWXD	4¼″x4¾″	404
DWXLD	4¼″x5″	426
DWXLDF	4¼″x5″	426
DRXB	4⅜″x5¼″	474
TCD-501	4½″x5¼″	501
DRXC	4⅝″x5¼″	529
DFXB	5″x6″	707
DFXC	5¼″x6″	779
DFXD	5½″x6″	855
DFXE	5⅝″x6″	895
TCD-895	5⅝″x6″	895
DFXH	5¾″x6″	935
DFXHF	5¾″x6″	935
8 CYLINDER		
DNX-V8D	6¼″x6″	1468
TCD-1468	6¼″x6″	1468

Neodesha packs 1-2 performance punch

1 | *Nordberg Diesels* 2 | *STANODIESEL Oil M*

Operator J. N. Finkinbinder (left) and Everett Powell, Neodesha Superintendent of Electric and Water Plants, adjust rocker arm assembly of Nordberg Duafuel Engine. Engine operated 40,431 hours before overhaul, carrying about 90% of load. All engines in service at Neodesha are Nordberg's. All use Standard Oil's STANODIESEL Oil M.

Finkinbinder and Powell inspect oil filter used for filtering STANODIESEL Oil M used in all six Nordberg Diesels at Neodesha, Kansas, power station.

Quick facts about STANODIESEL OIL M

- Keeps crankcase, pistons, cylinder walls clean.
- Combats deposit and wear problems imposed by using economy fuels.
- Maintains film on difficult to lubricate parts.
- Eliminates spark plug fouling in spark-ignited gas engines and reduces combustion chamber ash and deposits in engines burning natural gas, LPG and liquid fuels.
- Eliminates fuel injector and pump sticking caused by deposits on injector barrel and plunger where fuel and lube oil mix.

The city of Neodesha, Kansas, has six Nordberg engines in service. They have operated more than 400,000 hours on Standard Oil diesel lubricating oils. Here is the case story of one of these engines. The performance of this engine is typical.

In 1952, the city of Neodesha installed a 1,750 hp., 1230 kw., Nordberg Duafuel engine. During the period between February 14, 1952, when the engine went into service, and March 1, 1956, the engine ran 34,370 hours out of a possible 35,784. This is 96% of the engine's total installed hours. In this time, not even a piston or cylinder head was removed. So good was the performance of this engine using STANDARD HD Oil that when Standard introduced an improved diesel oil—STANODIESEL Oil M—in February, 1955, this engine was converted to this new oil.

There is more to the story. The engine continued in service to 36,223 hours when No. 7 cylinder liner was pulled to put rubber gaskets on liner to stop water leakage. At this time, No. 7 piston and liner were checked. Liner wear averaged only 0.0045 inches. The top ring showed an average wear of 0.016 inches. The No. 2 ring was 0.020 inches. Little, if any, wear was indicated on other rings. Now, at 40,431 hours, the engine is down for overhaul of turbocharger and to have valves ground. Bearings were found in excellent condition. No pistons are to be pulled.

Get more facts about STANODIESEL Oil M by calling the Standard Oil office near you in any of the 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY
(Indiana)